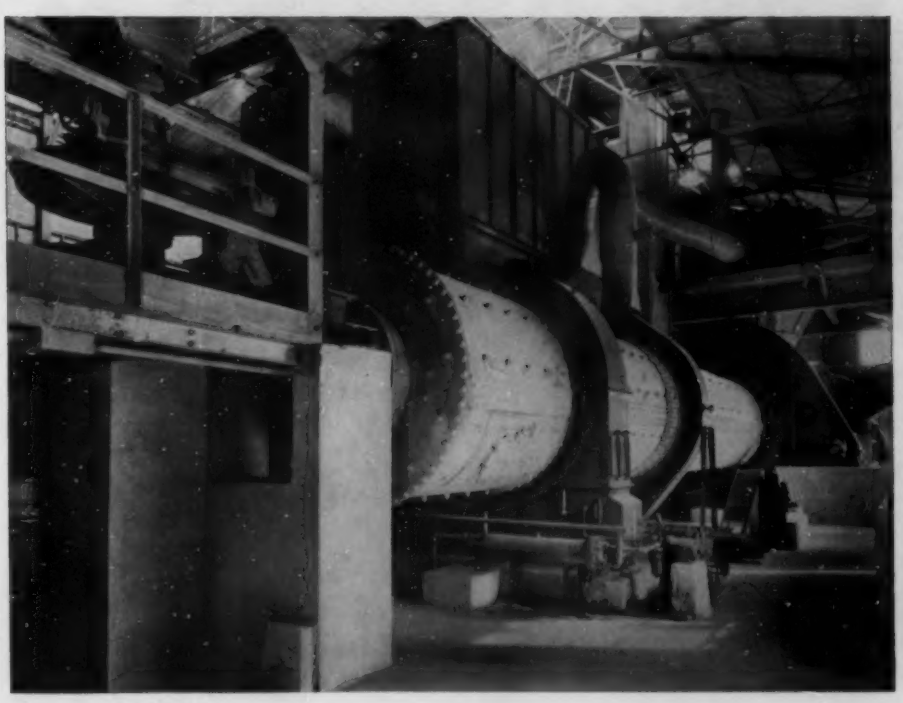
Rock Products

THE INDUSTRY'S RECOGNIZED AUTHORITY

MARCH, 1938

GRINDING MACHINERY



KOMINUTER
BALLMILL
TUBEMILL
UNIDAN
UNIKOM
TIRAX
ATOX

Wet grinding or dry grinding—open or closed circuit —gravity discharge or air swept—combined drying and grinding—direct firing or bin system.

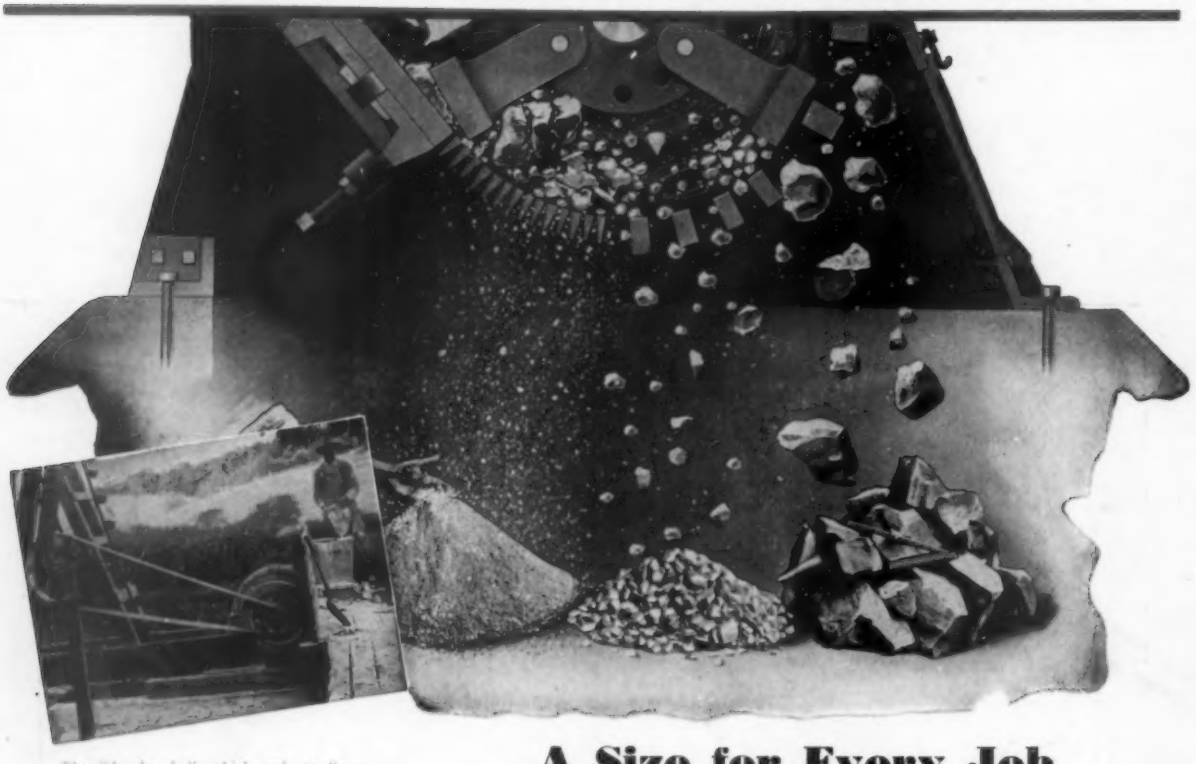
Also a complete line of accessories for the grinding operation such as air separators and classifiers, Trix wet separator, fans, liners, grinding bodies, spray casings, symetro gear boxes, feeders, conveyors, pumps, dust casings, washmills, etc.

F. L. SMIDTH & CO.

205 BROADWAY NEW YORK, N. Y.

Williams Hammer Crushers

Handle Larger Rock • 50% Less Investment • Better Product



The "Jumbo Jr." which reduces "one-man" size limestone to 1", ¾" or agstone

A Size for Every Job

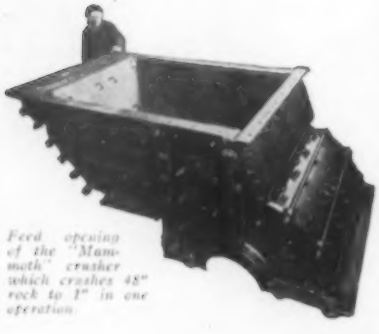
The "Mammoth" crushes 48" rock to 3", 2" or 1" in one operation. Takes the place of a primary breaker and recrusher.

The "Jumbo" reduces 20" to 30" rock to 1¼" and smaller.

The "Slugger" crushes screen rejects or "one man" size rock to 1", ¾", ½" and finer.

The "NF" type is supreme as a recrusher for reducing 5" stone to 1", 1½" and agricultural limestone.

The "Non-Clog" for crushing wet muddy rock. Cannot be clogged.



Feed opening of the "Mammoth" crusher which crushes 48" rock to 1" in one operation.

FINE GRINDERS • AIR SEPARATORS • DRYER MILLS

The Williams Patent Crusher & Pulverizer Co.

800 St. Louis Ave., St. Louis, Mo.

Sales Agencies in All Principal Cities Incuding

CHICAGO 37 W. VAN BUREN ST. | NEW YORK 15 PARK ROW | SAN FRANCISCO 326 RIALTO BLDG.

THE WILLIAMS PATENT CRUSHER & PULVERIZER CO. ST LOUIS U.S.A. TRADE MARK

REG US PAT OFF

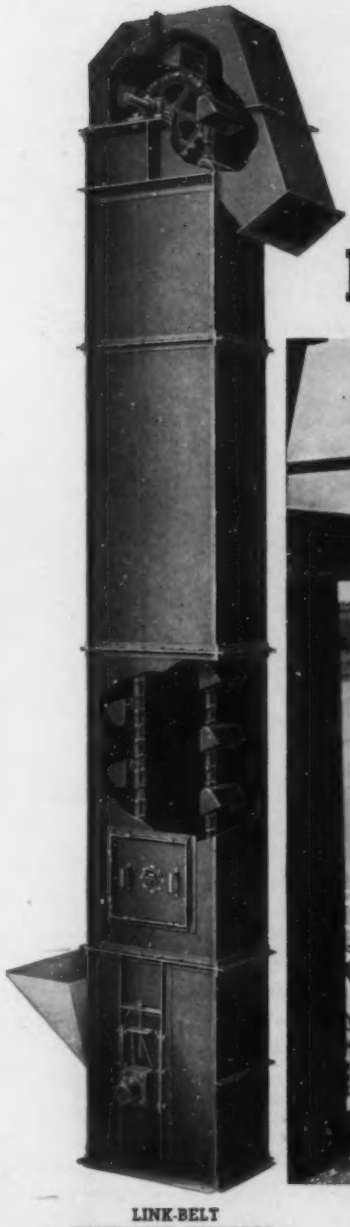
Williams

OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD

WILLIAMS

PATENT CRUSHERS GRINDERS SHREDDERS

Simple and Easy
MATERIALS HANDLING



Link-Belt Bucket Elevators handling Nitrate of Soda into storage warehouse.

LINK-BELT EQUIPMENT INCLUDES:

Complete Sand, Gravel, and Stone Washing Plants . . . Screens (vibrating, rotary and conical) . . . Washers and classifiers, of the screw, log, flight, Shaw and conical types . . . Dewatering Rotoscoops and Screw Conveyors . . . Conveyors and Elevators (belt, flight, screw, bucket, all approved types) . . . Speed-o-Matic Shovels-Draglines . . . Silent and Roller Chain Drives . . . Speed Reducers . . . Variable Speed Transmissions . . . Chains (Malleable Iron, PROMAL and Steel) . . . Sprockets, Buckets . . . Gears . . . Couplings . . . etc. Catalogs on request.

● When your materials handling problem requires the use of a bucket elevator, be sure to investigate the Link-Belt line. It is complete—and includes standardized units of the Centrifugal Discharge . . . Perfect Discharge . . . Continuous Bucket . . . Gravity Discharge . . . and Pivoted Bucket types.

Link-Belt's broad experience in the art of handling materials from where they are to where they are wanted next, is at your service. No order is too large nor too small to merit our painstaking attention.

Send for Catalog. Address: Link-Belt Company, Chicago, Philadelphia, Indianapolis, Atlanta, San Francisco, Toronto. Offices in Principal Cities.

7433-A

1939
NEW YORK WORLD'S FAIR EXHIBITOR METALS BLDG.

THE SYMBOL OF QUALITY LB LINK-BELT

LINK-BELT
Conveying and Transmission Equipment

Rock Products

With which has been consolidated the journals

CEMENT and ENGINEERING NEWS — Founded 1896

CONCRETE PRODUCTS — Est. 1918

Recognised the World Over as the Leader in Its Field

VOL. 42 CHICAGO, MARCH, 1939 No. 3

CONTENTS

Young America's opportunities—*Nathan C. Rockwood* 25

Modern wet process plant replaces "dry" mill—*C. D. Rugen* 26

Business conditions and outlook 34

Research, specifications and operating problems 36

Federal legislation and its effect on industry 38

Products and markets 39

Firing shaft lime kilns with unit coal mills—*Bror Nordberg* 41

Exhibits reveal progress in equipment 43

Crushed stone producers look to new markets for increased production 46

Research in crushed stone 51

Labor relations and national legislation 52

Preventing kiln troubles by finding the cause—Part 3—*W. S. Dickie* . 54

Mining engineers discuss topics of interest to rock products men—*Nathan C. Rockwood* 56

Sand-lime brick manufacturers becoming large users of cement 58

Lime putty producers hold meeting 59

Concrete house market grows with new products 67

Stress quality standards at cast stone convention 75

Solving cold weather problem handling ready-mixed concrete 77

New machinery shown at Concrete Industries show 80

Departments

Classified Directory of Advertisers 90

Concrete Products 65

Editorial Comments 25

Hints and Helps 60

Index to Advertisers 110

New Machinery and Equipment 62

News of the Industry 89

News of the Month 82

Personalities 64

NATHAN C. ROCKWOOD
Editor

RALPH S. TORGERSON
Managing Editor

BROR NORDBERG
Associate Editor

FRANK RICHTER
Assistant Editor

CONTRIBUTING EDITORS

VICTOR J. AZBE
St. Louis, Mo.

DR. F. O. ANDEREGG
Newark, Ohio

GEO. D. ROALFE
Los Angeles, Calif.

OWNED AND PUBLISHED BY

TRADEPRESS PUBLISHING CORPORATION

Publication Offices

205 WEST WACKER DRIVE, CHICAGO, ILL.

TELEPHONE—CENTRAL 0670

GEORGE C. WILLIAMS, *General Manager*

RALPH G. WHITE, *Advertising Manager*

L. V. RODDA, *Circulation Manager*

ADVERTISING REPRESENTATIVES

George M. Earnshaw, Eastern Manager,
522 Fifth Ave., New York City
Tel. Vanderbilt 3-7333

Richard M. Ward
2123 East 9th St., Cleveland, Ohio
Tel. Main 9645

Louis C. Thaon, Western Representative
Chicago office, Tel. Central 0670

Don Harway and Co., West Coast Representative,
155 Montgomery St., San Francisco, Calif.
Tel. Exbrook 8028

318 W. Ninth St., Los Angeles, Calif.
Tel. Tucker 9706

LONDON OFFICE

DONALD F. HUNTER, *Manager*,
2, 3, 4 Cockspur St., S.W. 1, England

Indexed in the Industrial Arts Index. Published Monthly. Subscription Price: United States and Possessions, Mexico, Cuba, Canada, $2.00; and $4.00 to foreign countries. Twenty-five cents for single copies.

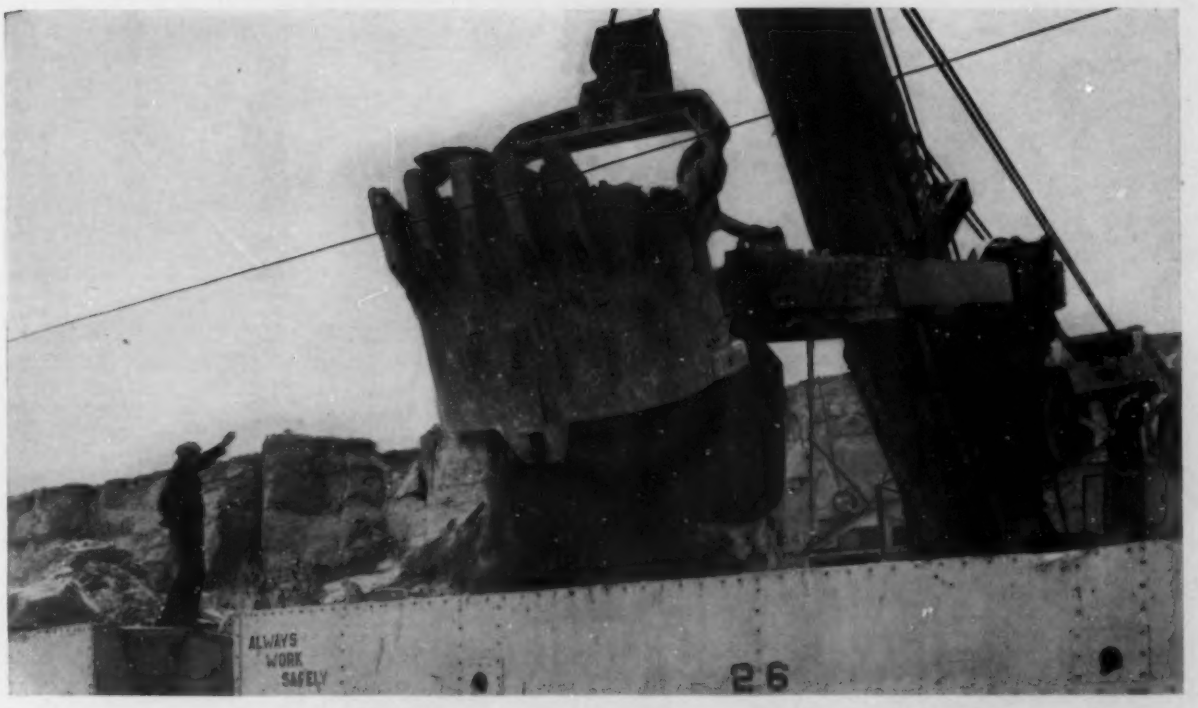
To Subscribers—Date on envelope indicates issue with which your subscription expires. In writing to have address changed, give old as well as new address.

ROCK PRODUCTS
Bears the Twin Hall-Marks of Known Value

Impartial measurement of reader interest in terms of paid circulation

Authentic facts relating to editorial scope and readership analysis

Entered as second-class matter, Jan. 30, 1936 at the Chicago, Ill., postoffice, under the Act of March 3, 1879. Copyrighted, 1939, by Tradepress Publishing Corporation (PUBLISHED MONTHLY).



Steel in Stock for Quick Maintenance and Repair

● Ryerson steels for the Rock Products Industry are helping maintain peak production schedules — avoiding tie-ups and minimizing delay. When something breaks — when construction or extensions are necessary, you can depend on immediate shipment of the exact steel you need from a nearby Ryerson plant. All Ryerson steels are of known, uniform, high quality. Stocks include everything from special abrasion resisting sheets and plates to structurals — from shafting to tool steel and babbitt. When you need steel for any purpose, specify Ryerson Certified. Immediate shipment is assured.

Let us send you the current Ryerson Stock List.

JOSEPH T. RYERSON & SON, INC. PLANTS AT: CHICAGO, MILWAUKEE, ST. LOUIS, CINCINNATI, DETROIT, CLEVELAND, BUFFALO, BOSTON, PHILADELPHIA, JERSEY CITY

Ryerson Stocks Include:

Beams and Structurals
Channels, Angles
Tees and Zees
Hot Rolled Bars
Hoops and Bands
Rails, Splices, Spikes, Bolts, etc.
Plates—Sheets
Alloy Steels—Tool Steels
Heat Treated Alloy Steel Bars
Stainless Steel
Cold Finished Shafting
Strip Steel, Flat Wire, etc.
Boiler Tubes and Fittings
Welding Rod—Mechanical Tubing
Rivets, Bolts, Nuts, Washers, etc.
Concrete Reinforcing Bars
Babbitt Metal and Solder

RYERSON *Certified* STEELS

RYERSON CERTIFIED STEELS

MEN MOLD MOUNTAINS

Sculptor Borglum's heroic figures look out across the Black Hills from 6000-ft. elevation

CLOSE-UP of the Mt. Rushmore Memorial Group at present. Note the enormous amount of granite that has been drilled and chipped so far. Note the workmen in various areas of the photo.

GUTZON BORGLUM'S famous Mt. Rushmore National Memorial, nearing completion in the Black Hills of So. Dakota, from a distance of 1500 feet. Washington, Jefferson, Lincoln, and Theodore Roosevelt will comprise the group.

OUT OF THIS MASS of granite, 6000 feet above sea-level, will emerge the likeness of Theodore Roosevelt. Thousands of cu. yds. of solid granite will have to be drilled and removed.

A CLOSE-UP of the partially finished likeness of Lincoln. Note ladders and cat-walks for comparative size. These figures are the largest ever to be hewn out of granite anywhere in the world.

ALL COMPRESSORS and air tools in use on this gigantic undertaking are Texaco lubricated 100%.

CHANGING the contour of mountains into heroic likenesses of men requires power from machines.

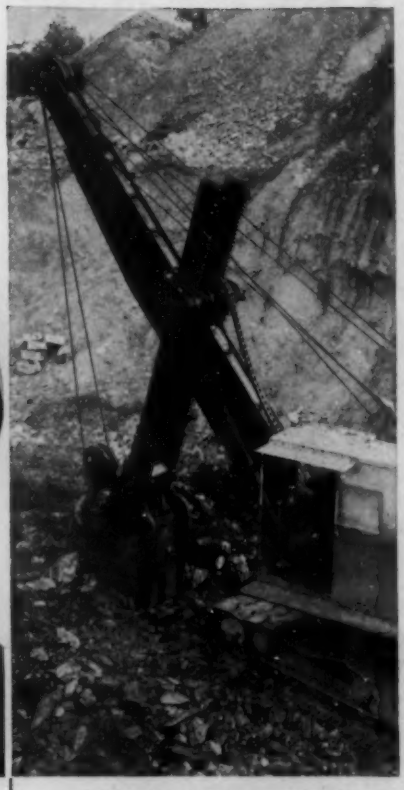
Texaco is proud of its association with this monumental undertaking, designed to commemorate the memory of these American immortals. The equipment used is Texaco lubricated 100%. The Texas Company, 135 East 42nd Street, New York City.

TEXACO

TEXACO

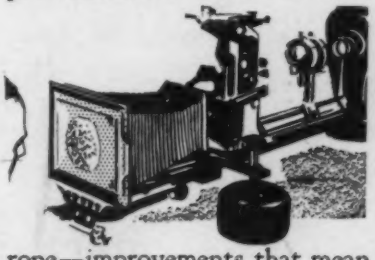
Industrial Lubricants

"You Needn't Worry About *this wire rope* ...Its Already Proved Itself on the Job!"



LABORATORY TESTED

One thing always impresses visitors at the Macwhyte mills. It's the continuous laboratory testing and checking of materials. These tests lead to constant improvements in wire and wire



rope—improvements that mean *savings for you* on the job.

FIELD PROVED

The laboratory works hand in hand with field engineers who

are constantly proving, improving, and perfecting ropes on the job. Together they give you the correct wire rope for *your* job.

"Quality, not Tonnage," Macwhyte's aim! Only the finest materials are ever used. Skilled craftsmen supervise every operation. FROM ROD TO REEL, MACWHYTE IS MADE TO MAKE GOOD.

MACWHYTE

Whyte Strand - PREformed

THE WIRE ROPE WITH THE INTERNAL LUBRICATION
LABORATORY TESTED—FIELD PROVED

IMPORTANT TO YOU

Macwhyte Shovel Ropes are "going to town" on jobs all over the country. When the going is rough and tough they do their best work. Why? Because Macwhyte ropes are specially designed, "custom built," for your particular type of equipment.

•

MONARCH WHYTE STRAND PREformed and Internally Lubricated

Macwhyte ropes are "custom built" for your job, that's why they are economical wire ropes. They're MADE TO MAKE GOOD (and make money, too) on YOUR JOB! Write us for prices and service records today!

MACWHYTE COMPANY • Manufacturers of Wire Rope and Braided Wire Rope Slings

Home Office: KENOSHA, WISCONSIN • New York... Pittsburgh...Chicago...Ft. Worth...Portland...Seattle... San Francisco...(Distributors throughout the U. S. A.)

TIMKEN ROCK BITS AT THE VICTORIA GRAVEL COMPANY, BURNET, TEXAS

This large quarry operator has proved that both increased production and decreased cost follow the use of TIMKEN Rock Bits. As a result TIMKEN Bits are used exclusively.

Most of the large-sized aggregate used in the construction of Mashall Ford Dam comes from this quarry. Approximately 700,000 tons will be shipped for this purpose.

The rock quarried here furnishes a real test for rock bits, hence the survival of the fittest—TIMKEN Bits.

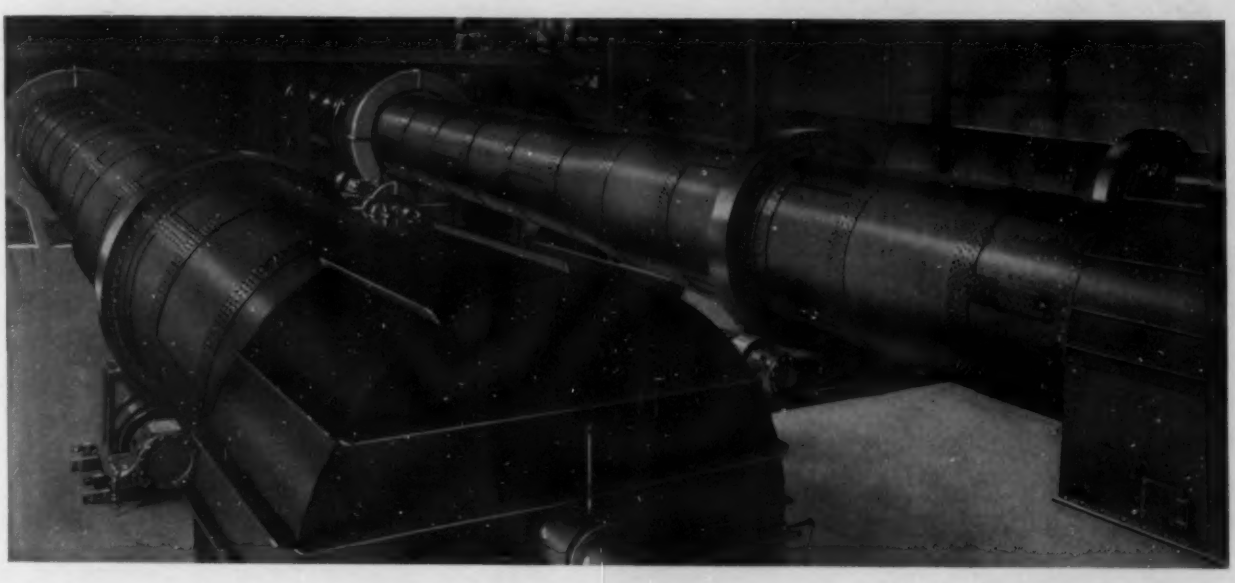
You too will find TIMKEN Rock Bits productive of large savings and increased output no matter what kind of rock you have to deal with nor what operating conditions may be encountered. It will pay you to adopt this modern rock drilling tool now. Write for further information.

THE TIMKEN ROLLER BEARING COMPANY
CANTON, OHIO

TIMKEN
ROCK BITS

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; TIMKEN Rock Bits; and TIMKEN Fuel Injection Equipment.

TRAYLOR
ROTARY KILNS
COOLERS AND DRYERS



WE BUILD

Rotary Kilns
Rotary Coolers
Rotary Dryers
Rotary Slakers
Scrubbers
Evaporators
Jaw Crushers
Gyratory Crushers
Reduction Crushers
Crushing Rolls
Grinding Mills
Ball Mills
Rod Mills
Tube Mills
Pug Mills
Wash Mills
Feeders
Rotary Screens
Elevators

Welded or Riveted Stacks, Tanks and Bins for any purpose.

they make good!

Good will, the most valuable asset in any business, is the practical expression of appreciation of honest service rendered. That, we are pleased to believe, is the reason for the high regard in which are held Traylor Rotary Kilns, Coolers and Dryers. They make good!

We could write a long story about how many cement and process plants are using our equipment, in how many states it is operating and how worldwide it is esteemed, but we fear the reader might be bored. Let it suffice that users have always found fully justified our claims of advanced design, efficient operation and economical maintenance.

Today, by reason of our highly developed technique in welding, Traylor Rotary Kilns, Coolers and Dryers are stronger, lighter and more dependable than ever, which is saying much! Prospective purchasers will do well to investigate this claim before making commitments. Today is the best time to write us, requesting our technician to call for a discussion of needs!

TRAYLOR ENGINEERING & MANUFACTURING CO.
ALLENTOWN, PENNSYLVANIA, U.S.A.

NEW YORK CITY 2916 Empire State Bldg.
CHICAGO 815 One La Salle Street Bldg.
SALT LAKE CITY 101 West Second South St.
LOS ANGELES 919 Chester Williams Bldg.
SEATTLE 6311 22nd Ave., N. E.

THE CANADIAN FAIRBANKS-MORSE CO., LTD. 986 St. Antoine St., Montreal, P. Q. Canada
B. C. EQUIPMENT CO., LTD. Vancouver, B. C., Canada

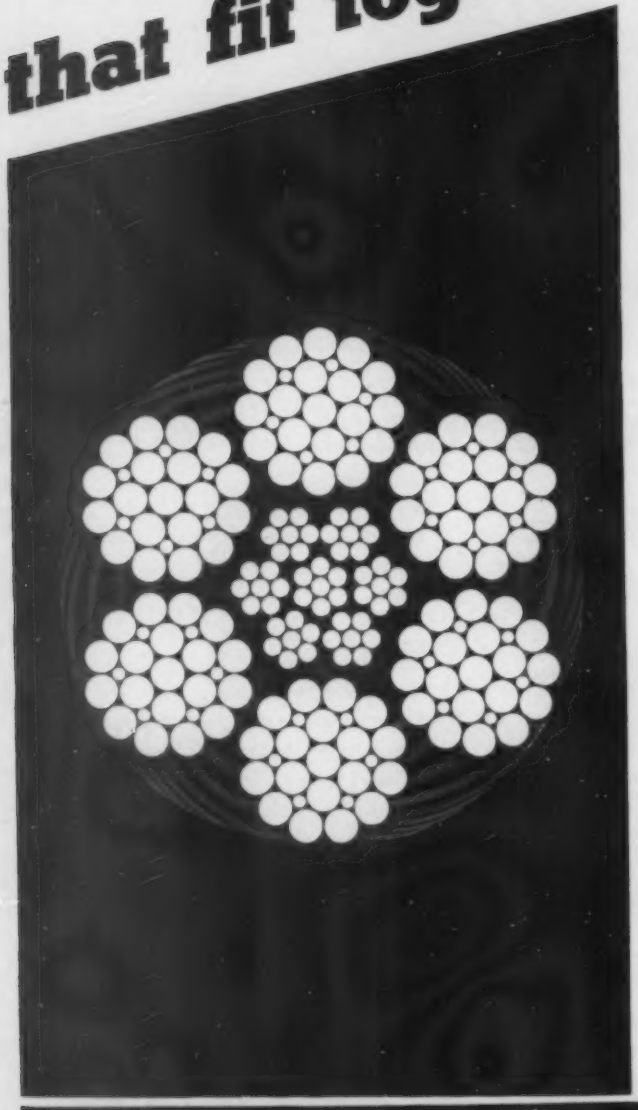
MAQUINARIA INTERNACIONAL S. R. L. Av. Francisco I. Madero No. 17, Desp. 214, Mexico, D. F.
MANILA MACH. & SUPPLY CO., INC. Manila and Baguio, P. I.

Export Department—104 Pearl St., New York City. Foreign Sales Agencies: London, Lima, Sao Paulo, Rio de Janeiro, Buenos Aires, Santiago, Valparaiso, Antofagasta, Iquique, Oruro

PURPLE-STRAND *FORM-SET* SHOVEL ROPE

BETHLEHEM Specify FORM-SET PRE-FORMED ROPE

199 moving parts that fit together perfectly



HERE are the moving parts of a heavy-duty machine—a Purple-Strand Form-Set Shovel Rope, 6 x 25 construction, IWRC. There are 199 of these parts, and they must fit together perfectly within a cross-section exactly one inch in diameter.

To design a rope of this type involved considerably more than merely fitting the required number of wires into a small space. Each outside wire must be solidly supported to avoid crushing on the drum. Each strand must be a tight yet flexible unit to withstand pressure and bending as it moves over sheaves. The center rope must be of the right lay and size to enable each strand to function properly as a part of the rope. And each of these factors must be tempered by a knowledge of probable drum and sheave sizes, operating loads and running speeds of a shovel.

Bethlehem Purple-Strand-quality ropes are precision machines. Designs of various Purple-Strand lines have been worked out to the most minute detail. The quality of the steel is the finest our metallurgical and melting organizations can produce. Wire drawing is in the hands of wire-mill craftsmen who specialize in rope wire. Machines making Purple-Strand are operated by men of the highest skill. From the premium-priced steel to the final testing and inspection, nothing is overlooked to make Purple-Strand Shovel Rope the finest that money can buy.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

Read the Answers

Why Other Dealers Are Going Into "Ready Mixed":

Because the ready-mixed concrete business grew right thru the depression and has one of the brightest futures in America today.

Because there is a better profit in selling ready-mixed concrete than in selling bulk sand, stone and cement.

Because it keeps your men, trucks and equipment working profitably the year 'round.

Because it improves your service, brings you new customers, increases your volume on allied lines.

Because anyone who owns trucks needs but a small additional investment in loading plant and mixers — and it is very easy to expand facilities as needed.

Why Most Successful Plants Buy Jaeger Truck Mixers:

Because Jaeger Truck Mixers produce a higher strength, more workable concrete, proven by impartial, recorded tests.

Because so many engineers and contractors recognize this higher quality and prefer to buy from Jaeger operators.

Because Jaeger 2-speed mixing and faster charging and discharging mean faster trips, more payloads, bigger earnings per unit.

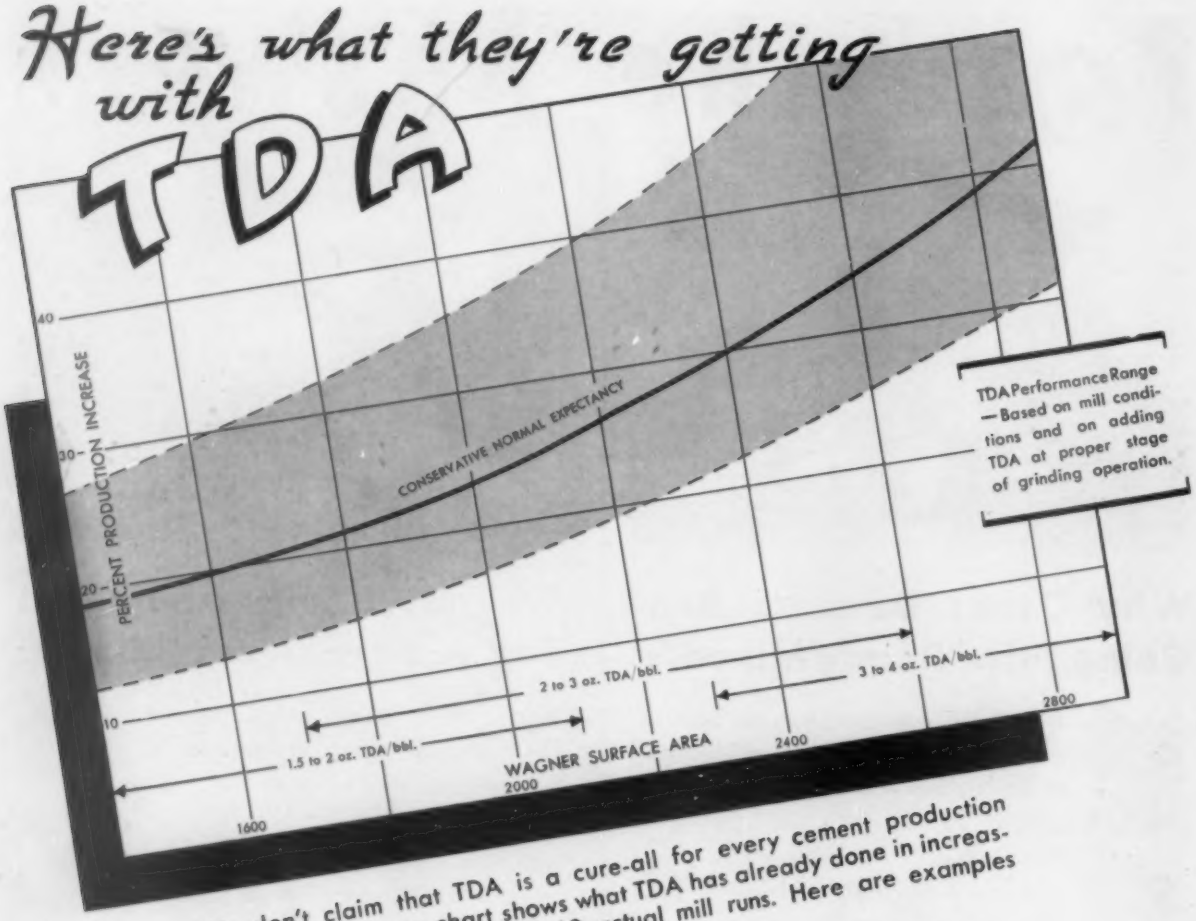
Because Man-Ten alloy steel, 3-point mounting, low center of gravity and correct load distribution make Jaeger maintenance amazingly low.

Because Jaeger operators reorder as they grow — some as often as 10 to 18 times.

40,000,000 CUBIC YARDS OF JAEGER CONCRETE TELL THE STORY — Write today for Specification TM-39, describing Jaeger Truck Mixers and plant methods which have sold far more ready-mixed concrete than any other equipment on the market.
THE JAEGER MACHINE COMPANY, 603 Dublin Avenue, Columbus, Ohio.

JAEGER TRUCK MIXERS 1, 1½, 2-2½, 3, 4, 5, 6 CUBIC YARD SIZES

Here's what they're getting with TDA



We don't claim that TDA is a cure-all for every cement production problem, but the above chart shows what TDA has already done in increasing finish mill production in over 60 actual mill runs. Here are examples from three different plants:

Case No. 1: A plant operator grinding H.E.S. cement in open circuit increased his production 53%. He reports that, in addition, he got higher strength, greater workability, and fewer headaches.

Case No. 2: Another user of TDA, grinding H.E.S. cement in a closed circuit with an air separator, obtained a 28% increase in production. The efficiency of his separator was improved as well.

Case No. 3: A producer grinding in the low-surface-area range finds that TDA is giving him a 30% increase in production in open-circuit operation.

Maybe TDA won't do all this for you, but isn't it worth a trial?

Look at the chart again. At the fineness you're grinding you can select for yourself the average production increase you can expect with TDA in your mills. Doesn't this again justify a trial? Our engineers will be glad to cooperate in every way in discussing your particular problem. Write Dewey & Almy Chemical Company, 80 Whittemore Ave., Cambridge, Mass.

TDA

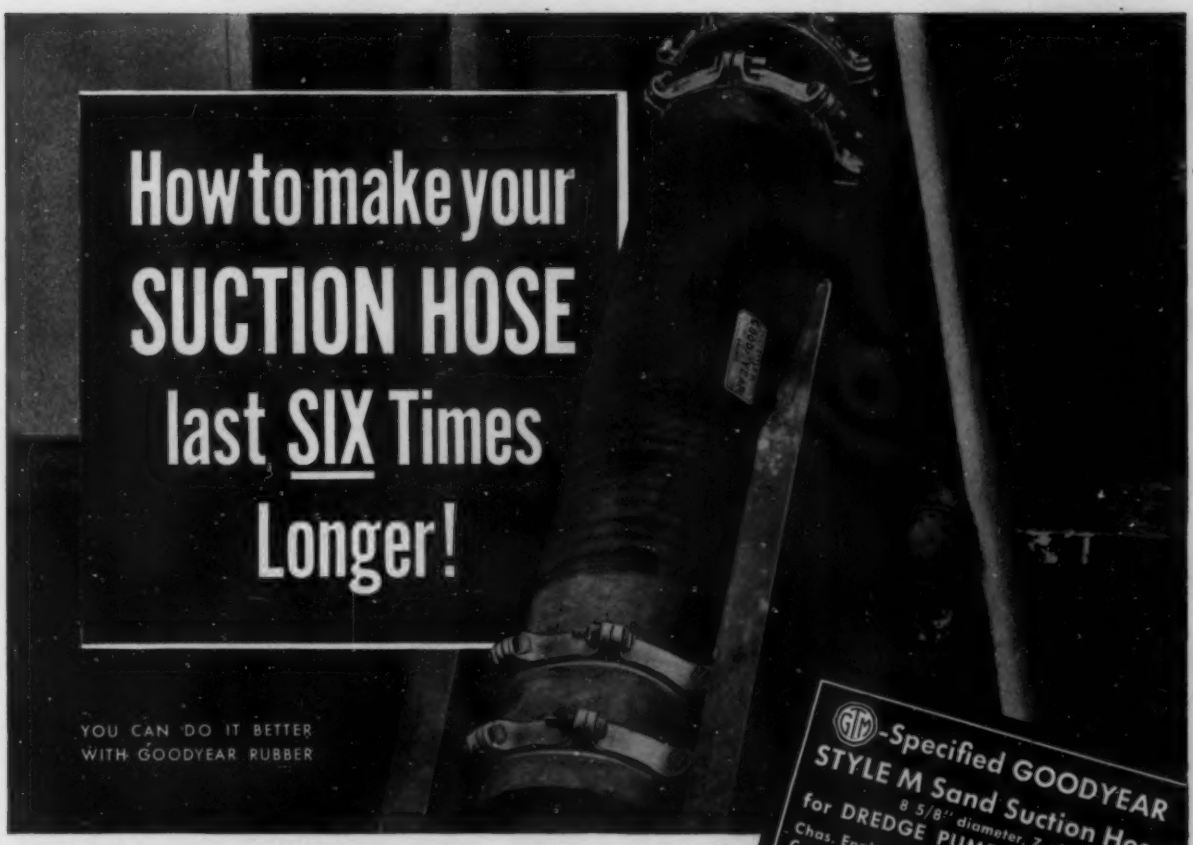
DEWEY & ALMY CHEMICAL COMPANY

CAMBRIDGE, MASS.

LONDON MELBOURNE OAKLAND MONTREAL

What is TDA

TDA is a mixture of triethanolamine salts and highly purified soluble calcium salts of modified lignin sulfonic acid. TDA is an excellent grinding aid. Its presence improves many of the important properties of concrete, such as durability, strength and permeability.



SIX months was the maximum service the Chas. England Gravel Company, Plainville, Indiana, had ever obtained from suction hose used to couple their dredge pump line. The combination of abrasion and severe twisting in this particular operation was just too much for the hose they were using.

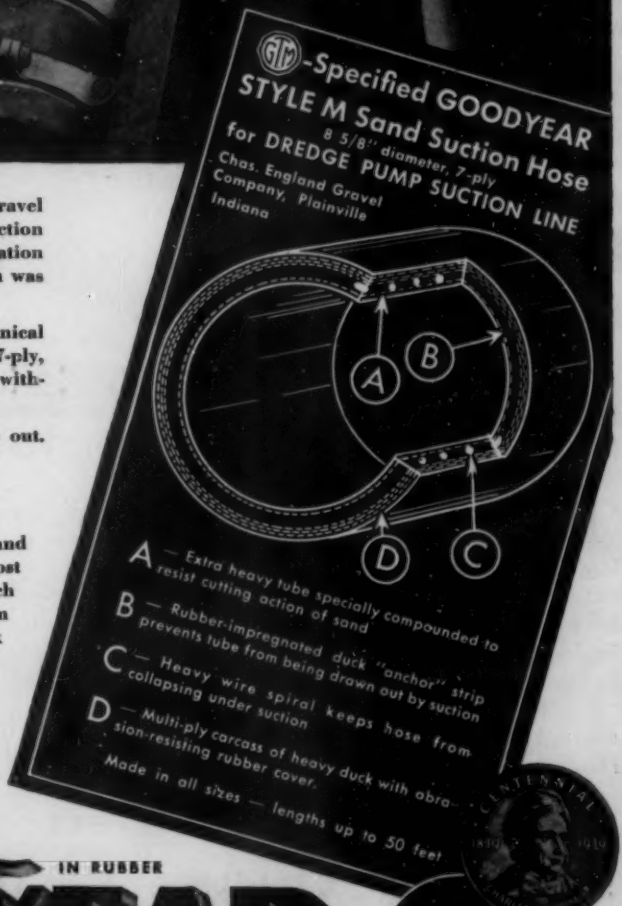
Then on recommendation of the G. T. M.—Goodyear Technical Man—a length of Goodyear Style M Sand Suction Hose, 7-ply, was installed on trial. Six months went by, a year, two years without any sign of failure.

Finally, at just a trifle under three years' service, it gave out. Needless to say, it was replaced with another Goodyear.

Specify Goodyear and Save

The Goodyear Style M cost no more than the former hose and it lasted nearly *six* times longer—an 83% saving in hose cost with no lost time for replacements every few months. Such economical performance is typical of the service you get from all Goodyear products built for the sand, gravel and rock industries—air and water hose, dredging sleeves, conveyor and transmission belts.

That's why it pays to consult the G. T. M.—you can do it better with Goodyear rubber. To bring this friendly consultant to your plant, write Goodyear, Akron, Ohio, or Los Angeles, California—or phone the nearest Goodyear Mechanical Rubber Goods Distributor.


GTM-Specified GOODYEAR
STYLE M Sand Suction Hose
8 5/8" diameter, 7-ply
for DREDGE PUMP SUCTION LINE
Chas. England Gravel Company, Plainville Indiana
A
B
C
D
A — Extra heavy tube specially compounded to resist cutting action of sand
B — Rubber-impregnated duck "anchor" strip prevents tube from being drawn out by suction
C — Heavy wire spiral keeps hose from collapsing under suction
D — Multi-ply carcass of heavy duck with abrasion-resisting rubber cover.
Made in all sizes — lengths up to 50 feet

THE GREATEST NAME IN RUBBER

GOODYEAR

BELTS • HOSE • MOLDED GOODS • PACKING

CENTENNIAL OF CHARLES GOODYEAR'S DISCOVERY OF VULCANIZATION

...GOOD THING
THEY USED EXCELLAY HERE
FROM THE DAILY REPORT OF A
TIGER BRAND WIRE ROPE ENGINEER
Yes sir—time is money on this job. They're working under a penalty clause. Tough digging slowed them down at the start, but the job is sailing along smoothly enough now, and it looks like they'll beat the deadline.
Just to make sure, I gave the wire rope a once-over today. You can tell it's had some tough treatment, but I'm sure it'll finish the job with plenty to spare. Good thing, though, that they used our Excellay Preformed Rope. Any other rope there would have given them trouble long ago.
Yours,
al

TURN your wire rope questions over to a Tiger Brand Wire Rope Engineer. He lives and breathes wire rope, spends most of his time seeing it in action, checking its performance, studying ways and means of saving you money.

These engineers know what they are talking about, because they spend most of their time right out where the rope is used. They know what punishment it has to stand and how to stretch your wire rope dollar. Besides, they have no axe to grind—they are not interested in promoting any one construction or grade of wire rope over any other. For American Tiger Brand Wire Rope is made in all constructions and all grades.

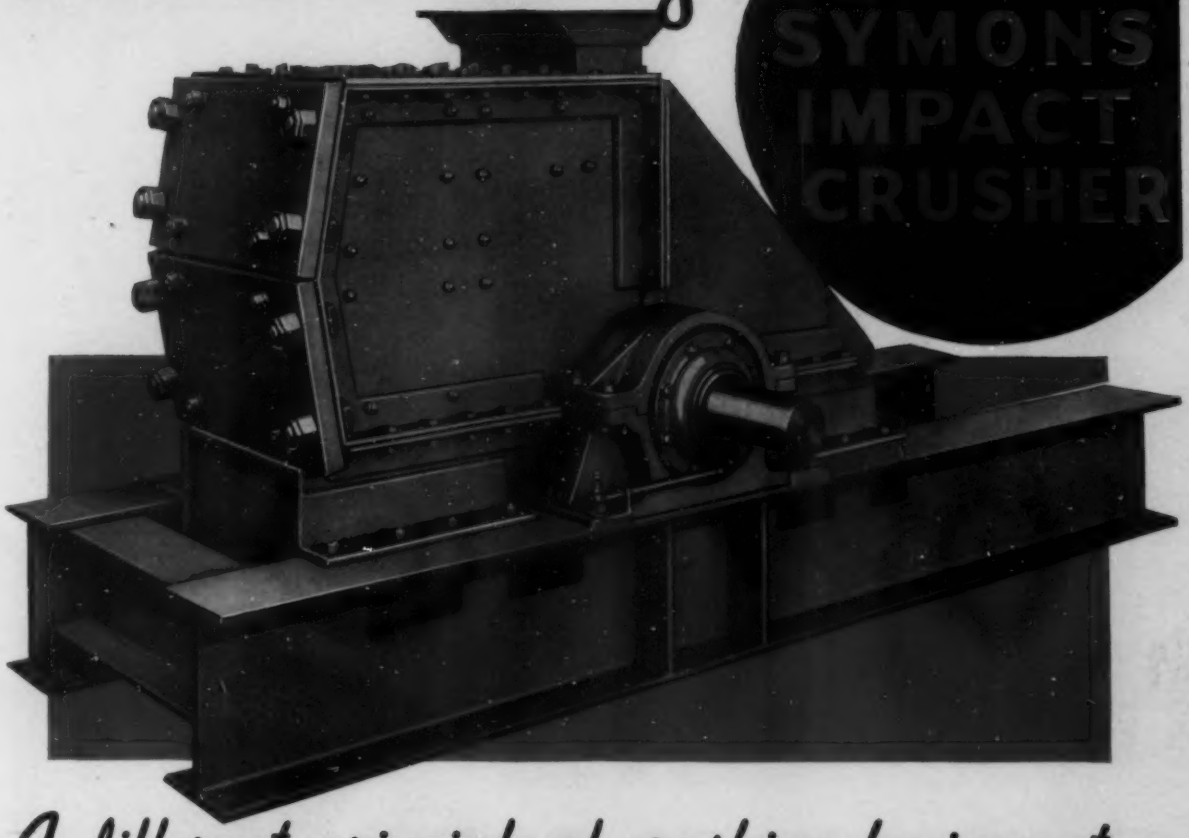
USS

EXCELLAY
Preformed
WIRE ROPE

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York
COLUMBIA STEEL COMPANY
San Francisco
United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

Announcing the NEW SYMONS IMPACT CRUSHER



A different principle of crushing by impact...

- **Makes a more cubical product . .**
- **Non-slip angle of impact . . .**
- **Less wear to crushing members .**
- **Maintenance expense reduced . .**
- **Helps eliminate soft stone . . .**

Here is a crusher that is as much of an advancement over other crushers operating on the impact principle as the Symons Cone was over the gyratory. Perhaps you have a crushing job that can best be done by this new crusher. *Investigate its features. Write for descriptive bulletin.*

NORDBERG MFG. CO., MILWAUKEE WISCONSIN

NEW YORK 60 E. 42nd St. | **LOS ANGELES** Subway Term. Bldg. | **TORONTO** Concourse Bldg. | **LONDON** Bush House

Prevent WIRE ROPE Corrosion!

Proper wire rope lubrication prevents corrosion—maintains rope safety—lengthens rope life—reduces wear—saves money

CORROSION is one of wire rope's greatest enemies. Unchecked, it will greatly shorten the useful life of a wire rope. It can easily reduce the safety of a wire rope to a point where further use of the rope is hazardous. Yet, to the eye, the rope may appear only slightly rusty—most of the damaging corrosion may be confined to the hidden inner wires.

The first detrimental effect of corrosion is microscopic pitting—unseen to the naked eye. But it results in early wire breakage.

As the corrosion makes headway it becomes visible. It binds the wires—prevents their free movement, one against the other. The rope loses elasticity. Individual wires break. Ability to absorb impact and sudden shock becomes a gamble.

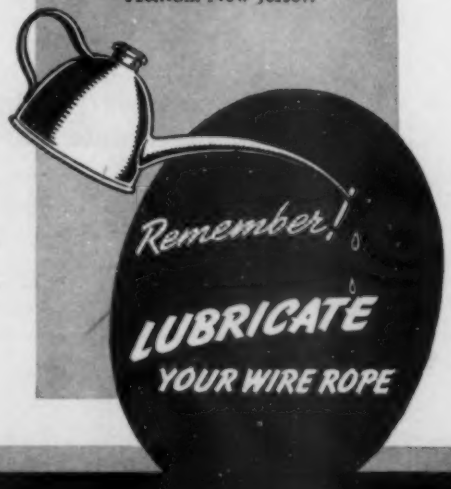
No wire rope can be furnished with enough lubricant to last a lifetime. Therefore, to prevent corrosion—to assure safety:

(1) Lubricate your wire ropes regularly; (2) with a lubricant especially made for wire rope application; (3) and suited to your own individual operating conditions.

This advertisement is published in the interest of all wire rope users, to help them obtain greater safety, service and efficiency from their wire rope.

For advice on wire rope lubrication

FOR further information regarding the proper lubrication of your wire ropes, consult the nearest Roebling branch office or our main office, Trenton, New Jersey.



JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY BRANCHES IN PRINCIPAL CITIES

EXTREME HIGH FINENESS

WHEN you produce materials of microscopic fineness and constant uniformity, you need the super degree of classification made possible by the Raymond DOUBLE WHIZZER Mechanical Air Separator.

This machine is giving results far beyond those obtained by the single whizzer or from any other type of separator known today. In a recent installation, a lime products plant is getting a remarkably high percentage of finished material, testing 10 microns and under, in classifying a special grade of calcium carbonate. This new commercial process has proved particularly satisfactory in making a superior product at reduced cost.

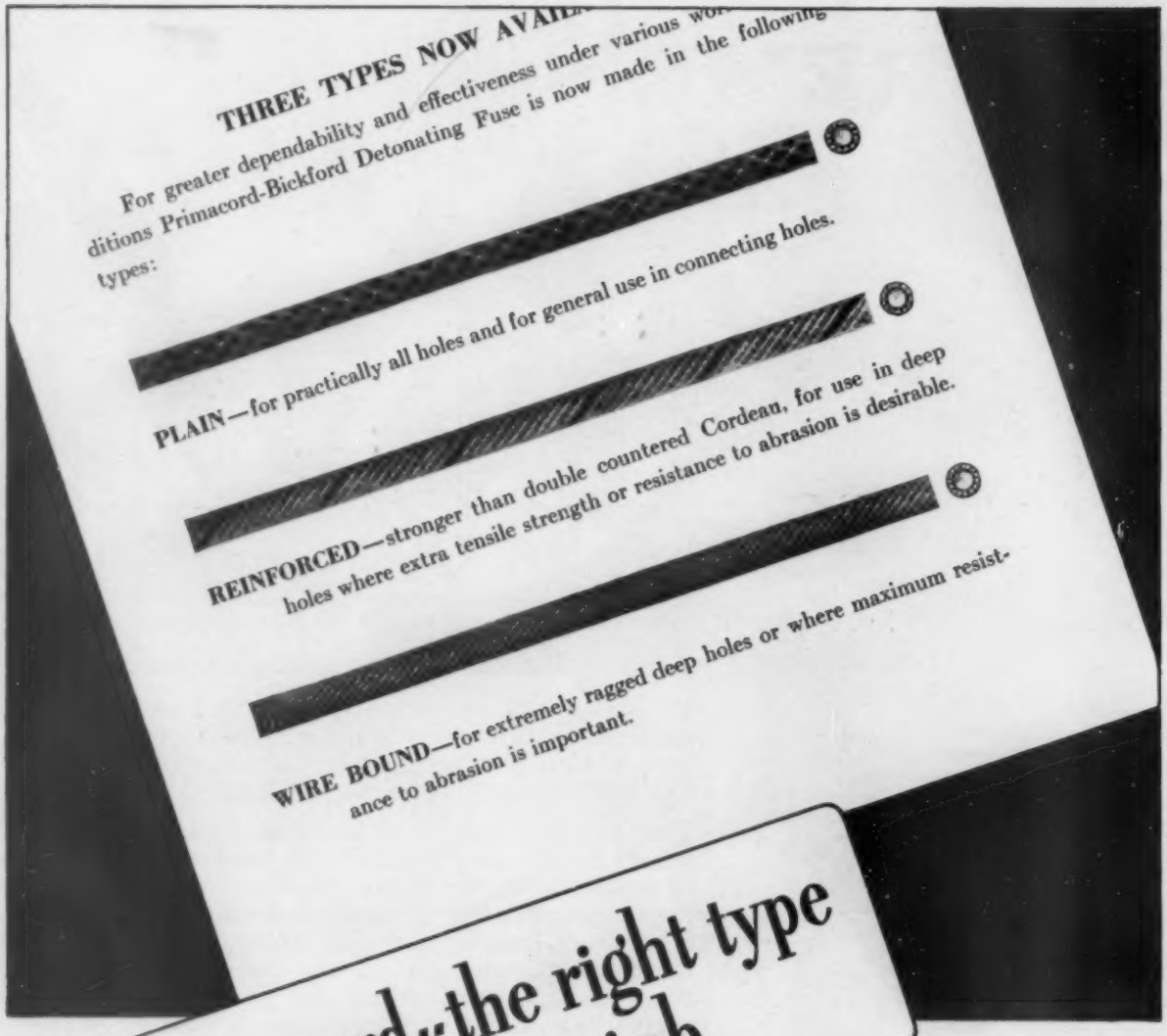
If you have any such problem in superfine separation, Raymond engineers can give you the benefit of specialized experience. Your inquiries are invited on the production of low micron sizes of:

Bentonite	Cement Clinker	Phosphate Materials
Kaolin	Raw Mix	Hematite
Calcium Carbonate	Hydrated Lime	Magnesite
Limestone	Pigments	Talc
Trap Rock	Chalk	Slate
	Gypsum	

RAYMOND DOUBLE WHIZZER Mechanical Air Separator

Write for Raymond Separator Catalog No. 30

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1307 North Branch Street CHICAGO
Sales Offices in Principal Cities • • • In Canada: Combustion Engineering Corporation, Ltd., Montreal


THREE TYPES NOW AVAIL
For greater dependability and effectiveness under various wo
ditions Primacord-Bickford Detonating Fuse is now made in the following
types:
PLAIN—for practically all holes and for general use in connecting holes.
REINFORCED—stronger than double countered Cordeau, for use in deep holes where extra tensile strength or resistance to abrasion is desirable.
WIRE BOUND—for extremely ragged deep holes or where maximum resistance to abrasion is important.

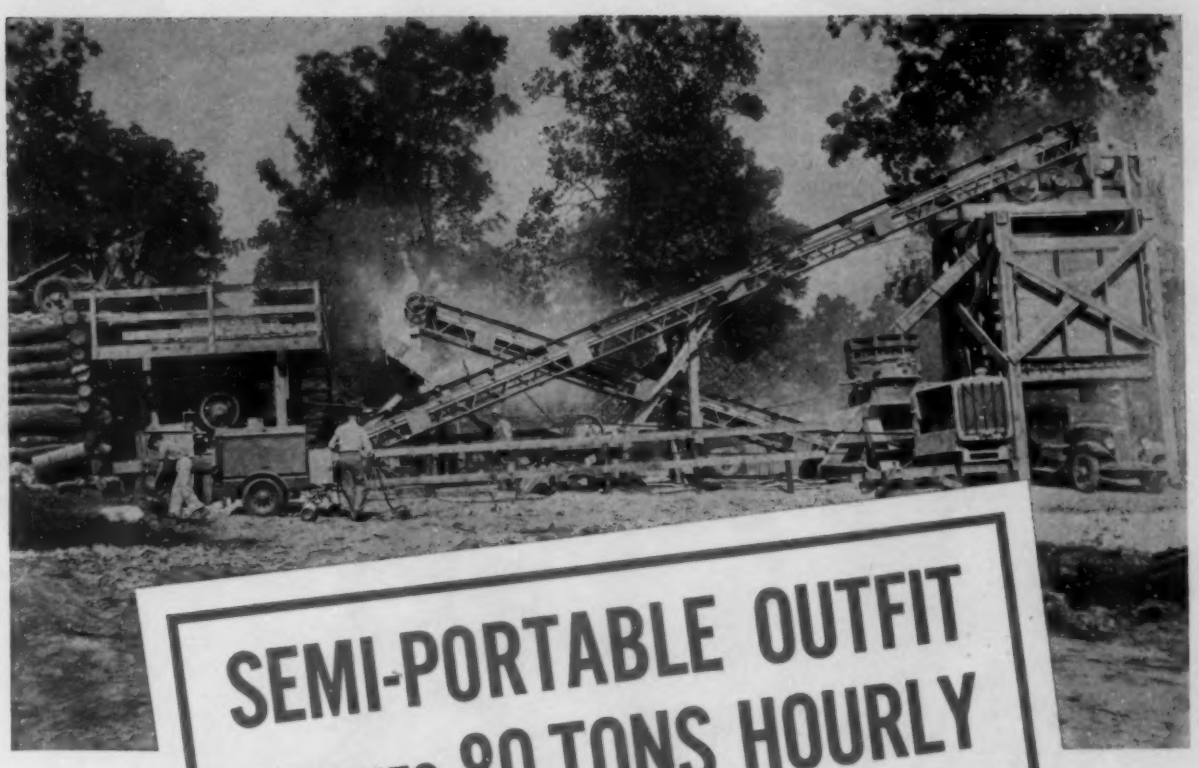
Primacord--the right type for every job

Primacord-Bickford, the new insensitive detonating fuse, is made in these three types to meet every demand of an instantaneous blasting fuse.

Write for the free Primacord Booklet and complete information on this improved detonating fuse. THE ENSIGN-BICKFORD COMPANY, Simsbury, Conn., U.S.A. *Makers of Cordeau-Bickford Detonating Fuse —and Safety Fuse Since 1836.*

PRIMACORD·BICKFORD *Detonating Fuse*

FB6



SEMI-PORTABLE OUTFIT CRUSHES 80 TONS HOURLY

Here's a semi-portable quarry plant that "crushes more stone in a ten-hour shift than any other plant in North Carolina," according to Lee G. Smith, who was in charge for the owner, Nello Teer of Durham, N. C.

The plant has just finished crushing 40,000 tons of minus 1½-in. rock for a new road on Route 152, North Carolina, for the State Highway and Public Works Construction. The rock there is a very hard granite, but this sweet-running Telsmith Crushing Plant kept right on turning out its 800 tons of minus 1½-in. every ten-hour shift.

So smoothly has it operated that not once was there a mechanical failure, and no productive time was lost during the entire job. Typical Telsmith performance!

The new road extends 9½ miles between China Grove and Rockwell, small towns near Salisbury, N. C.; and is 30 ft. wide at the fills and 35 ft. wide in the cuts. All of the rock had to be minus 1½-in., with about 35 per cent minus ¼-in. material. The engineer for the state was G. H. Ehringer.

The rock was hand-loaded into skip pans. Thirteen trucks, each hauling four tons a trip, brought the skip pans to the coarse crusher, a No. 13-B Telsmith Gyratory Crusher. After crushing, a 24-in. x 68-ft. latticed steel frame Telsmith Portable Belt Elevator carried material direct to a 4-ft. x 10-ft. Telsmith Triple Deck Pulsator.

Oversize from this vibrating screen was chuted to the secondary crusher, a No. 36 Telsmith Gyrasphere Crusher; and a 24-in. x 38-ft. Telsmith Portable Conveyor took the re-crushed material back to the main conveyor for re-screening. A 95 hp. Diesel engine drove the entire plant. Six men took care of all maintenance and operation, including feeding the primary crusher and loading trucks from the bin.

Telsmith builds rock crushing and gravel washing plants of all sizes and types—portable, semi-portable and stationary—designed to fit your conditions and equipped for faster production, lower upkeep and more profitable operation. You'll want details... Write for *free Bulletin* Q-11.

SMITH ENGINEERING WORKS
508 EAST CAPITOL DRIVE, MILWAUKEE, WISCONSIN
Cable Addresses: Sengworks, Milwaukee — Concrete, London
Associates in Canada: Canadian Vickers, Limited, Montreal and Vancouver

50 Church Street, New York City
211 W. Wacker Drive, Chicago, Ill.
713 Commercial Trust Bldg., Philadelphia, Pa.
81 Blaney Street, Cambridge, Mass.
412 Westinghouse Bldg., Pittsburgh, Pa.
Brandeis M. & S. Co., Louisville, Ky.
QC-3-39

TELSMITH

Produces RESULTS

Industrial journals that *produce results* need no exaggerations nor exultations. They speak a language of their own to buyers of space and it is *good*.

ROCK PRODUCTS is *that kind* of an industrial journal. *It produces results.* And in addition, it has all of the other qualifications advertising men like to talk about. Circulation covers every worth-while plant in the industry. The excellence and completeness of its editorial content has earned for it universal recognition as *The Industry's Recognized Authority.*

ROCK PRODUCTS is not the only journal serving this industry, but it does *produce the results*, which after all is the ultimate goal of all advertising. Buy it on that basis and your advertising in this field will be more sure of its profit making possibilities.

ROCK PRODUCTS

205 WEST WACKER DRIVE ; CHICAGO, ILLINOIS

GILMORE WIRE ROPE

More Economy in Cost

More Perfection in Service

Other J & L Steel Products:

Standard Pipe in seamless and welded—Seamless Steel Boiler Tubes—Hot Rolled Shapes—Abrasion Resisting Plates—Bar mill products including Bars for Concrete Reinforcement — Bar size shapes—Track Spikes—Wire Nails and Spikes—Galvanized Sheet Steel Roofing and Siding—Woven Wire Fencing—Barbed Wire—Soft Annealed Wire.

One special point about Gilmore Precisionbilt Wire Rope all users appreciate is the added service it invariably gives when subjected to hard. . . . oppressively hard service usually occasioned in mines and quarries, excavating and road work.

This naturally reduces the cost—because after all you don't buy Wire Rope—you only buy service.

The price of Wire Rope of all makes is practically the same—but do you always get what you pay for? That's why we wish to prevail upon you to try Gilmore Precisionbilt Wire Rope the next time. Try it in comparison with what you now use. Buy it with the expectation of getting longer and much more satisfactory service—you'll find it has paid you well to use ropes built with precision in a modern plant. There's quite a difference—you'll notice it. Try one on your next replacement.

J&L STEEL

GILMORE WIRE ROPE DIVISION
MUNCY · PENNSYLVANIA
JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH PENNSYLVANIA

DESIGNED for PROFITS

Universal Equipment at Grove Stone & Sand Co., Grovestone, N. C.:

10"x36" Roller Bearing Jaw Crusher.
40"x20" Crushing Rolls.
10" Horizontal Rail Grizzly.
48"x8' Revolving Scrubber.
Three-deck Gyrating Screen.
80'x24" Feeder Conveyor.
Mechanical Feeder.
32'x18" Return Conveyor.
59' Gravel Elevator; 24" Buckets.
59' Sand Elevator; 14" Buckets.
(Plant designed by the Universal Crusher Company)

by UNIVERSAL

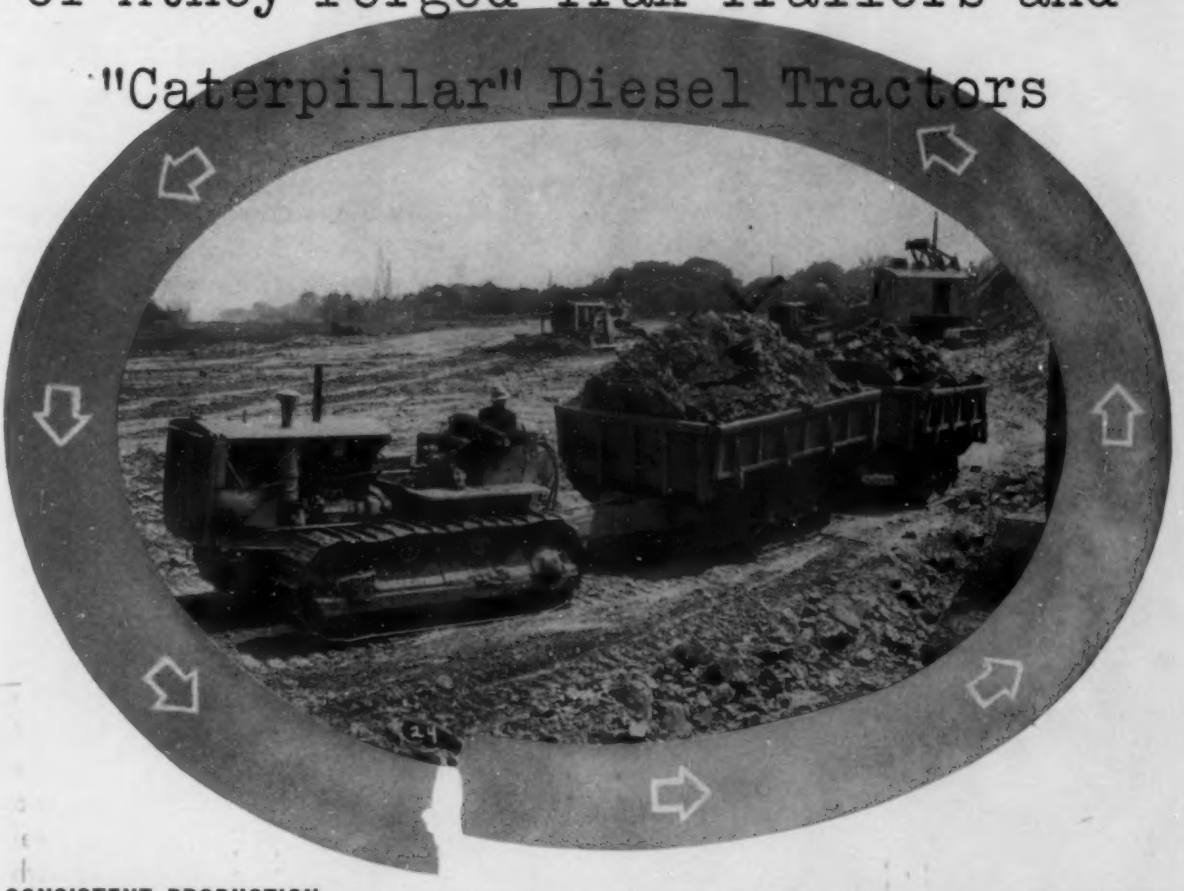
Again, Universal engineers have scored. This time by converting an unprofitable, obsolete operation into a modern, high capacity, low cost per ton plant. A plant that will pay profits from the start, on every ton, and for years to come. Don't gamble — consult engineers who know and manufacturers who produce quality equipment. Over 33 years of tackling and licking tough jobs enables us to turn out clean gravel and sand at a profit from this loamy deposit and with half the power used by the old plant!

Whether it's a stationary, portable or semi-portable plant or merely a crusher — you're getting the "cream" of experience when you call in Universal men. It's their "main line," not their side line. How about "Universalizing" your plant into greater yardages and increased profits?

UNIVERSAL CRUSHER COMPANY
617 C Avenue West, Cedar Rapids, Iowa

UNIVERSAL

Solve your hauling problems with the "Assembly Line" efficiency of Athey Forged-Trak Trailers and "Caterpillar" Diesel Tractors



CONSISTENT PRODUCTION Constant, predetermined speed! No time lost in clearing a roadway, under the shovel —or on the dump.

DAILY APPLICATION You can profitably use Athey Forged-Trak 2-Way Dump Trailers and "Caterpillar" Diesel Tractors for both winter and early spring stripping or hauling of ore, rock and all classes of materials.

NO COSTLY ROAD MAINTENANCE Athey Trailers and "Caterpillar" Diesel Tractors practically eliminate the need for roads. And you don't have to pay for tires that get cut by sharp stones, rocks and rutted roadways!

FEWER HAULING UNITS NEEDED Because these units can carry big-capacity loads profitably all the year round, you can spread your production requirements over the entire year—and save the cost of extra hauling units.

EASIER, FASTER DUMPING Two-way dumping to right or left without slowing up, stopping or maneuvering—fast, clean dumping over the edge of the fill, into the tipple or railroad car, or waste area.

LONGER HAULING LIFE Athey Forged-Trak Wheels have the most accurately predetermined life of any hauling equipment. Performance under any given job conditions lives up to the estimate when the job is properly analyzed. Athey Trailer bodies are rugged.

Mail the coupon for free booklet.

See your "Caterpillar" Dealer

ATHEY TRUSS WHEEL CO.
5631 West 65th St., Chicago, Ill.
Cable Address: "Trusswheel," Chicago

ATHEY
FORGED-TRAK TRAILERS

ATHEY TRUSS WHEEL CO.,
5631 West 65th St., Chicago, Ill.

Gentlemen: Please send me your free illustrated folder, "Assembly Line Production," showing how Athey Forged-Trak Trailers can cut hauling time and costs.

Name .....

Address .....

City ..... State .....

Where industrial dusts are not efficiently controlled, profits fly away with them. This is the plain fact, in no sense exaggerated. For dusts, produced in almost every industry, have a far wider influence upon costs than is commonly realized.

Many dusts are intrinsically valuable: to lose them is to lose a profitable source of income. Other dusts have an adverse effect upon production: they reduce the working efficiency of man and machine, increase the costs of maintenance and overhead.

Investigate! Find out *how*, and *how much*, you can save by scientific dust control. Take this first important step today: write for our *Bulletin D81*—free to any managing executive or operating engineer.

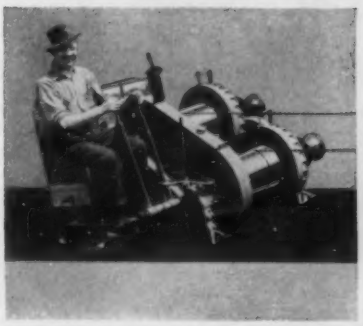
If you have a SMOKE problem you can readily solve it with Buell Fly Ash Collectors. All of the unique advantages of the Van Tongeren system are found in them—advantages convincingly demonstrated in hundreds of installations. Ask us to send you *Fly Ash Booklet A93.*

Buell Dust Collectors are engineered individually to meet the requirements of each specific job. They are the *only* collectors which bring you the combination of high extraction efficiency and low operating costs which the patented Van Tongeren design ensures. Maintenance costs are so slight as to be negligible. Operating costs are practically nil.

BUELL ENGINEERING COMPANY INC
SUITE 5000, 2 CEDAR STREET, NEW YORK

buell
DUST COLLECTORS

SALES OFFICES IN PRINCIPAL CITIES



CAR PULLER . . . . . DERRICK HOIST . . . . . ELEVATOR HOIST . . . . . PILE DRIVER HOIST . . . . .

READY AND ABLE FOR EVERY JOB

The AMERICAN GENERAL PURPOSE HOIST

The very last word in hoists for general hoisting, hauling and pile driving work. Meets every modern requirement of speed, strength, easy handling, absence of useless weight; low price. The one drum hoist can be expanded to three drums and slewer in the field. If your present work can be done with a one drum hoist, why pay for more until needed?

Now available in the following sizes: 35 H. P., 50 H. P., 75 H. P., and 100 H. P. Gasoline, Diesel or Electric power.

The Greatest Value for Your Hoisting Engine Dollar

Write Dept. RP
For Catalog No. 100-H-1

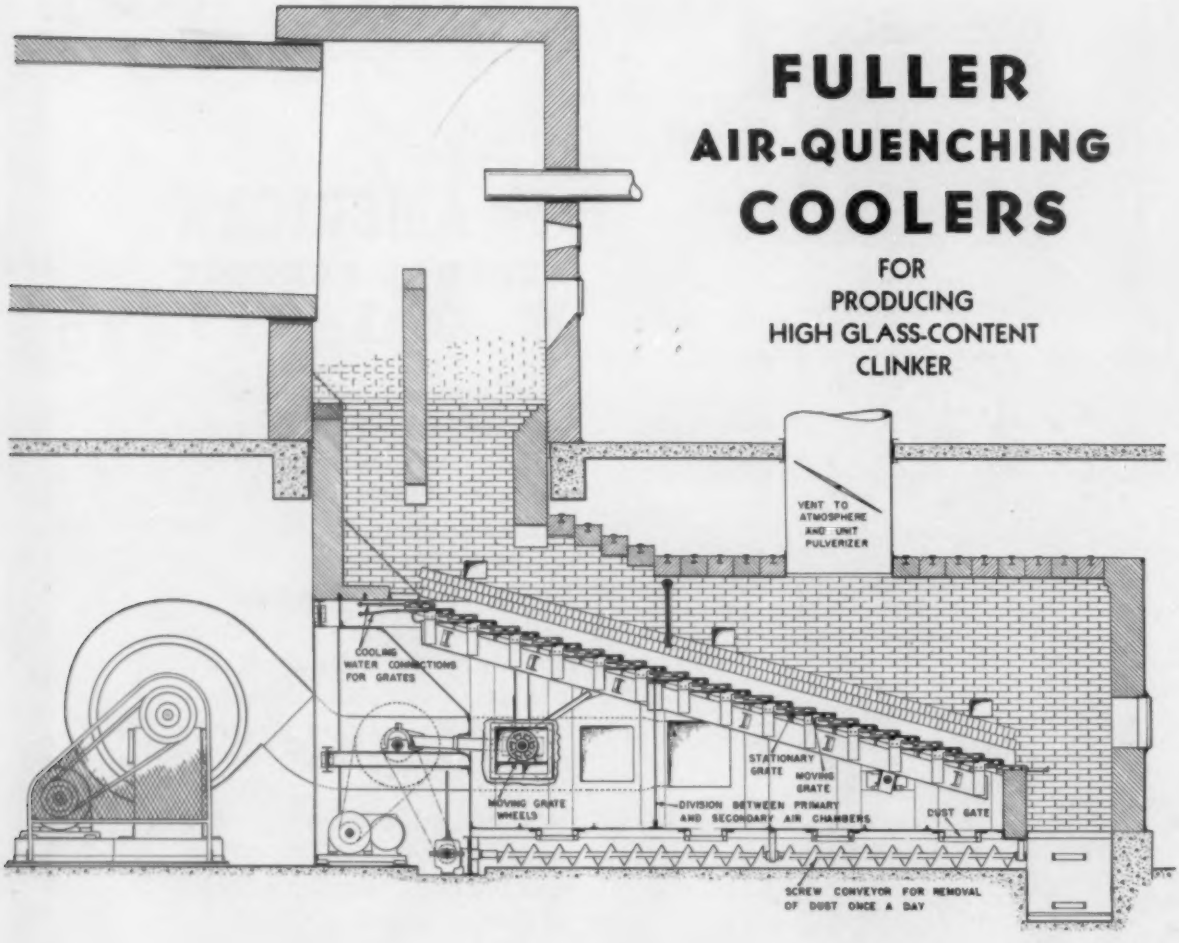
the genuine
Crosby Clip
THE SAFE FASTENING FOR WIRE ROPE

AMERICAN HOIST & DERRICK CO.
SAINT PAUL, MINNESOTA

AMERICAN TERRY DERRICK COMPANY
SOUTH KEARNY, N. J.
Branch Offices NEW YORK - - CHICAGO

FULLER
AIR-QUENCHING
COOLERS

FOR
PRODUCING
HIGH GLASS-CONTENT
CLINKER


VENT TO ATMOSPHERE AND UNIT PULVERIZER
COOLING WATER CONNECTIONS FOR GRATES
STATIONARY GRATE
MOVING GRATE
MOVING GRATE WHEELS
DIVISION BETWEEN PRIMARY AND SECONDARY AIR CHAMBERS
DUST GATE
SCREW CONVEYOR FOR REMOVAL OF DUST ONCE A DAY

FEATURES OF
FULLER AIR-QUENCHING COOLER

Abrupt chilling for production of clinker of high glass content

Mechanically simple; requires comparatively little maintenance

Clinker forms as a substantially flat inclined bed, moved at a uniform rate from chute to discharge end

Grates are water cooled; fixed grates alternate with moving grates

High and uniform combustion air temperatures

Operation under direct observation at all times

Air chamber may be entered a few minutes after clinker is by-passed or stopped

Drive mechanism simple; outside of cooler

Low power requirements

WRITE FOR BULLETIN CO-1
FOR DESCRIPTIVE DETAILS.

THE drawing above illustrates one of the three Fuller Air-Quenching Clinker Coolers to be installed by one of the large cement companies. This installation is of the combined recuperator and final cooler type, with divided chamber. Each of these coolers is to have a capacity of 1000 barrels a day; clinker delivered to the primary or recuperator section at approximately 2500 Deg. F., to be reduced in the final cooling section to approximately 200 Deg. F. In this installation the recuperator section will supply secondary combustion air to the kiln; the air from the final cooling section to be vented to atmosphere and to the unit pulverizer firing the kiln.

Fuller Coolers are built in various types. Some already installed are of the two-stage type, i.e., the recuperator section and final cooling section are separate and distinct units, each independently controlled. They are also built to serve as a final cooler to recuperators already installed or as a recuperator only.

Fuller Coolers are designed with the distinct purpose of securing the maximum efficiency in air quenching to produce clinker of high glass content, efficient heat recuperation, and to discharge clinker at the final temperature desired for grinding.

FULLER COMPANY

CATASAUQUA, PENNSYLVANIA

Chicago: 1118 Marquette Bldg.
San Francisco: 320-321 Chancery Bldg.

CO-1

FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS · · · · ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS · · AUTOMATIC BATCH WEIGHERS · · BIN SIGNALS

©C1B 409219
MAR 10 1939

ROCK PRODUCTS

Young America's Opportunities

We read recently that the Bureau of Labor Statistics of the U. S. Department of Labor is engaged in a survey of industry to determine what opportunities still exist for young Americans. The problem of finding jobs for those just starting their business and industrial life *is* a serious one; one that should receive far more attention than the unemployment problem as a whole; because the unemployment problem of older men will end when their lives end, if not before; and while their idleness is a genuine economic loss, the inability of young men to find places is more than that, it is an urgent threat to our future as a nation—the kind of a nation we have known and loved, and the kind that we hope our sons will know and love.

But somehow a statistical approach to "opportunities" does not ring true. Opportunities are not ripe fruit growing on bushes and trees to be counted and tabulated. Opportunities are something created either by employers or enterprisers, or by those seeking employment. Many opportunities exist in industrial organizations for the profitable employment of young blood that employers do not or will not see, and a great many more could be created by those who seek employment, or want to use their talents, if they could be inspired to develop more initiative and vision. Perhaps we are all getting to rely on opportunities created or developed by some one else, and altogether too much on the measly opportunities provided by a paternal government.

The February issue of this journal contained two "want" advertisements for quarry superintendents—good "news," and tangible opportunities. But what about some of the less obvious opportunities in this industry. In our April issue will start a series of articles by a relatively young man who graduated from an Eastern college in civil engineering. He has worked with a state highway department, with the production department of a crushed stone company and is now one of its sales managers. He was curious, as all aggregate producers are curious, to know why there are so many specifications for aggregates for the same purposes; why it was often difficult to meet these specifications even after most careful and conscientious processing.

This man persuaded his company to invest in some laboratory testing equipment, he got the part-time services of an engineering student, he studied and analyzed every step in the production process. Briefly, he coördinated the sales and production departments. The company with the help of his study is in a position to simplify its processing operations and to sell crushed stone to standardized specifications which have been available to both producer and consumer, but little used because it takes just such work as this man did to sell local engineer and architect users.

There probably is not an aggregate producer with an output of say over 150,000 tons a year who could not profit by the services of a young engineer who could do plant testing and coördinate sales demands with production possibilities. If that young man were wide awake he could also take on supervision of safety work, and numerous other duties that would make for more efficient and economical production, and he could also serve the sales end of the business as a trouble shooter. Not many employers are going out looking for young men as a result of reading this, but young men who can see opportunity might sell themselves sufficiently to get a small toe-hold in an industry which is going to need more and more the services of technically trained men for both production and saleswork.

The lime industry is actually in crying need of young scientific brains and enthusiasm. But probably very few lime manufacturers would admit it. Here probably is the most ancient manufacturing industry in the world, certainly the oldest chemical industry, manufacturing a product that enters into processing in literally a thousand ways. Yet a fundamental basic study of lime and what else it might be used for has never been made. All the business that has come to lime manufacturers from other industries has come because processors in those industries have discovered the value of lime and demanded lime. Only in very recent years have they succeeded in getting a few lime manufacturers to make the *kind* of lime they wanted to buy.

The portland cement industry has been more kind to young technical men than any of the other rock products industries in recent years, but even this industry has hardly scratched the surface of possibilities. Thanks to the activities of one thorough-going user and specification writer the time apparently is not far off when cement manufacturers will not simply "burn" clinker, they'll give it scientific heat treatment and have to be in a position to prove it has had such treatment——both in burning and cooling.

Nathan C. Rockwood

Modern Wet Process Plant Replaces "Dry" Mill

By C. D. RUGEN*

A modernization program at the Leeds, Alabama, plant of the Universal Atlas Cement Company was completed during 1938, the former dry process mill being completely replaced with a new wet process mill utilizing the latest developments in cement-making machinery. Portland cement has been produced at this site since 1907 when the original plant was built by the Standard Portland Cement Co. The old plant with additions made from time to time to increase its capacity was operated continuously up to completion of the present new plant. An excellent source of raw materials has enabled production of a high quality product throughout the history of this operation.

Every department of the plant was affected by the recent modernization. Mechanization of the limestone quarry included a new well drill and electric shovel, electric haulage system and primary and secondary crushers. The old dry process raw material mill was replaced by modern wet process, closed circuit grinding. Two new 10- x 300-ft. kilns with unit firing and modern clinker coolers were installed. Two of the old 10- x 125-ft. kilns will be retained to maintain the original producing capacity. An entirely new closed circuit clinker grinding installation was made. Raw and clinker grinding departments have ample capacity to take care of the output of both old and new kilns. A modern, air-conditioned, architectural concrete building housing the plant offices and laboratories and a building containing shops, storeroom, and change rooms were also constructed.

New cement storage tanks and packing facilities were completed early in 1937 as the first step in the modernization of this plant.

The new Leeds plant is the first wet process installation made by the Universal Atlas Cement Co., and the third cement plant in this country to utilize closed circuit wet raw grinding. This process has been used rather generally in the ore dressing industry. The installation has presented some interesting problems particularly to those whose whole experience has been in dry process milling. Ease of chemical control, savings in power, maintenance, and in number of units required for a given output are the principal advantages gained from this circuit. With the exception of the two kilns, the old plant will be dismantled entirely.

Quarrying and Crushing

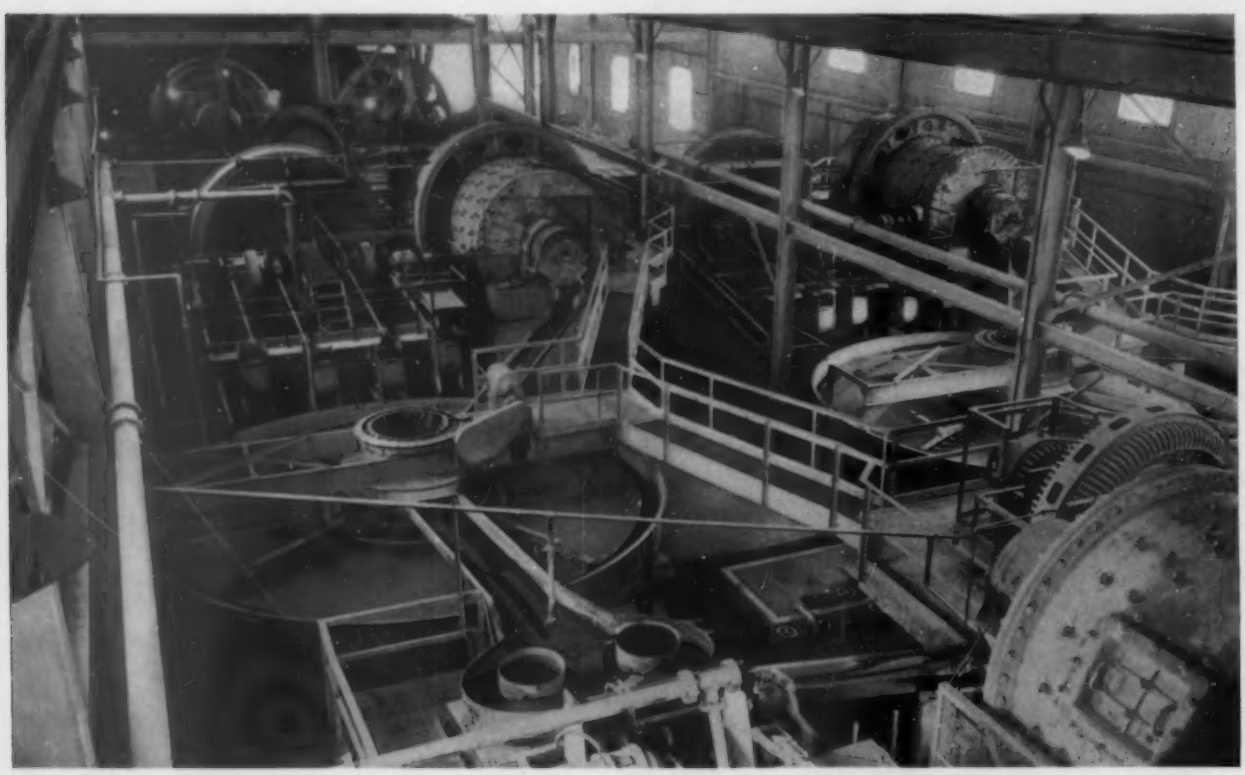
Raw materials used at this plant are limestone, shale, and sandstone which are required in the following approximate proportions for standard portland cement:

Limestone	80-82 per cent
Shale	15-17 per cent
Sandstone	2-4 per cent

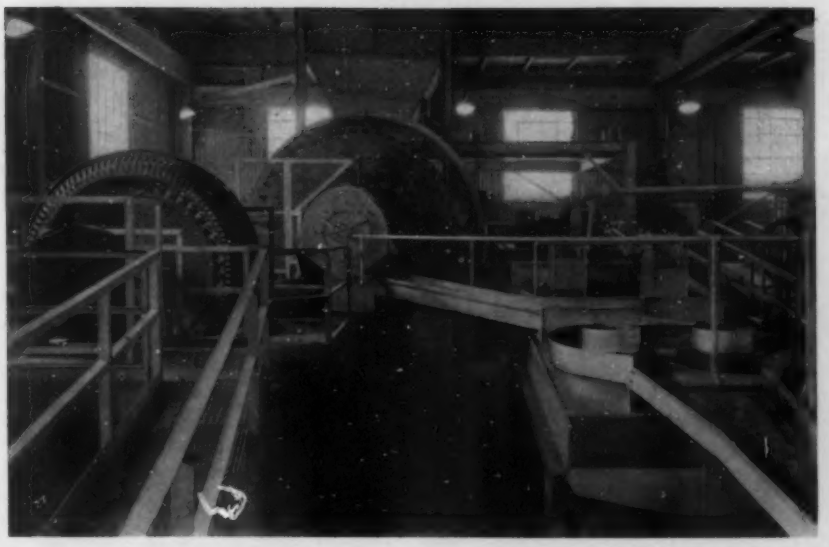
Some iron ore is needed in addition for the manufacture of special or modified cements.

Limestone, which constitutes the principal raw material is obtained from

* Mr. Rugen is assistant operating engineer of the Universal Atlas Cement Co., Chicago, Ill.



General view of raw mill room. Primary mill and rake classifier in foreground, bowl classifiers in the center, and secondary mills in the background



Close-up of multizone classifier and preliminary mill in the raw grinding department.

an open pit quarry directly adjacent to the plant. The stone exists in what is known as the Chickamauga or Pelham formation and is of quite uniform quality. There are some clay seams present which were rejected under former hand quarrying methods. The use of this clay with the present mechanized operation results in a reduction of the average carbonate content of the down stone by one or two percent. Crushing and proportioning this stone, which averages about 92 percent carbonate, involves no difficulties with the new equipment. Some stripping is necessary to remove from two to six feet of overburden. Working faces are from 90 to 100 ft. high and are churn-drilled for the full depth of the face with 9-in. holes generally spaced about 20 ft. by 20 ft. Normally from eight to twelve holes are shot per blast. Holes are loaded with 60 percent quarry gelatin with an average reclamation of six to seven net tons per pound of explosive. A full revolving crawler type electric shovel with a 2½-cu. yd. dipper is used for loading the down stone. This shovel, equipped with Ward-Leonard controls, is powered by a 2200-volt, 150 hp. motor, driving three 250-volt d.-c. generators for each of three d.-c. motors.

Haulage

Stone is hauled about a quarter of a mile over a double-track third rail electric haulage system to the crushing plant. Each haulage car is equipped with its own d.-c. traction motors, and is moved singly rather than in a train. Cars are electrically spotted for loading from the quarry floor. The movement of cars between quarry and crusher and their dumping at crusher is controlled by an operator at the crusher house who has a full view of quarry, crusher and all connecting trackage. Cars have a capacity of 10½ cu. yd. (about 18 net tons) each, and when loaded operate for a considerable part of their haulage distance up a 9 percent grade. Motors are regenerative and provide automatic dynamic braking on down grade. Sections of track are energized successively as the car moves along. Operating power is 250 volts, d.-c. produced by a 300 k.w. motor generator set.

A 42-in. gyratory crusher driven with a 250 hp. motor is used for primary reduction. Product of this crusher, which is 6-in. and under, is fed by an inclined pan conveyor to a 42- x 66-in. hammer mill. Hammers rotate at 900 r.p.m. and are reversible, thus providing four wearing faces per hammer. Breaker plate position is adjusted to compensate for hammer wear and to regulate sizing of crushed stone. Normal sizing of this crushed product is under 1-in. with about 50 percent under ¼ in. The hammer mill discharges to a belt conveyor which passes over an automatic scale and delivers into the raw material storage. The hammer mill and pan conveyor housings are vented to a cloth type dust collector which keeps this operation clean.

Shale and Sandstone

The shale quarry is located about a mile from the plant. The shale strata are somewhat folded and occur between limestone and sandstone ledges. Down shale is loaded with a new 1½-cu. yd. electric shovel to tram cars which are hoisted up an incline to a crusher house. Crushing is done in a No. 5 gyratory followed by a hammer mill. The crushed shale is hauled by either truck or railroad to the plant, where it is dumped into a receiving hopper which feeds a belt delivering over scales to the raw material storage.

Sandstone quarried at the top of a mountain above the shale quarry is found in strata varying from several inches up to five or six feet in thickness. Loading of sandstone is by hand to tram cars, which are lowered on tracks down the side of the mountain to the shale crusher. After crushing, transportation to raw material storage is similar to that of the shale.

Raw Material Department

Shale and sandstone are weighed into storage separately over an automatic belt scale. Because of their smaller requirements these quarries are operated intermittently by the same crew, normally three days per week on

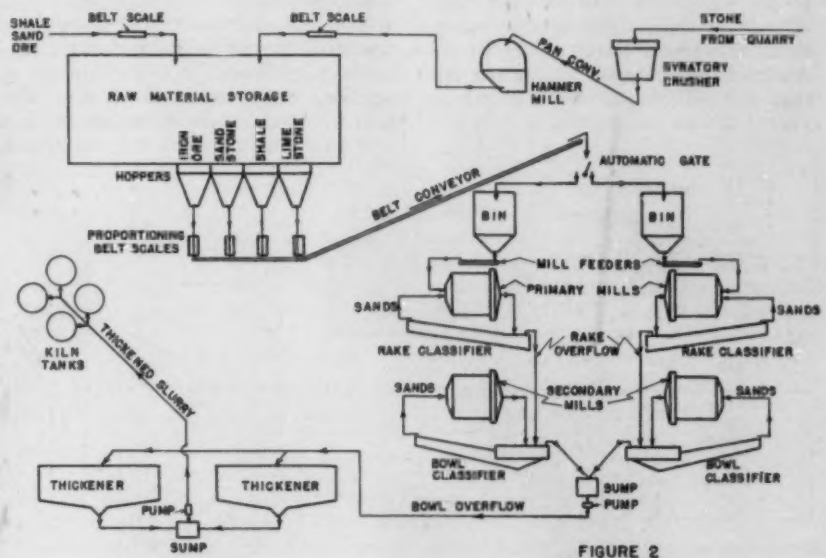


FIGURE 2
RAW MATERIAL FLOW SHEET

Raw material proportioning scales discharging to conveyor belt.

shale and two days per week on sandstone.

Crushed raw materials are reclaimed from the 100- x 384-ft. storage by an overhead 10-ton bridge crane with a 3-cu. yd. bucket, which places them in hoppers. Four hoppers are provided, one each for limestone, shale, sandstone, and iron ore. Under each hopper is an automatic proportioning belt scale which can be set to deliver a predetermined tonnage per hour. The scale settings, controlled by the plant laboratory, are based on regular chemical analyses of the ground raw mix. Speeds of the proportioning belts are synchronized, each running at its proportionate constant rate. The ratio of individual belt speeds to each other is roughly in proportion to the relative requirement of each material since all are designed to operate under about the same load depth. A safety switch installed over each belt will shut all down if any one hopper blocks or empties and fails to deliver.

Discharge from the scales is to a common belt, which conveys the proportioned mix to the raw milling department. An automatically timed gate at the conveyor belt discharge delivers the material alternately to each of two 25-ton hoppers for feed to the primary rock mills. In this manner both hoppers are kept filled to about the same level and segregation is minimized. Electric bin-level indicators are installed to guide the operation of the proportioning belts and the distribution of material to the two hoppers.

The mill feeders are of the constant weight type similar in principle to the proportioning belt scales. These result in uniform feed rates for each grinding unit. The original installation provided table feeders at this point but these proved unsatisfactory. Variations in moisture content, sizing and clay inclusions considerably affected the angle of repose of the material on the feed table and resulted in an irregular delivery per revolution. Since a uniform feed is essential to obtain maximum output and satisfactory fineness from such grinding units the table feeders were replaced by the constant weight type. Moisture content of the crushed mix as delivered by these feeders will vary from 2 to 4 percent. This slightly affects the dry basis delivery, but such variation is of little consequence.

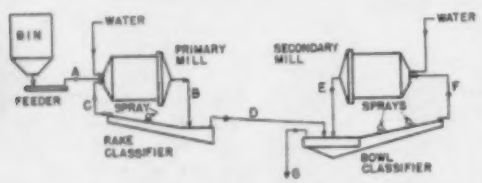
Raw Grinding

There are two complete wet raw grinding circuits. Each circuit consists of a 9½ ft. dia. by 8 ft. long primary ball mill, closed circuited with a multizone rake classifier and a 9½ ft. by 8 ft. secondary ball mill closed circuited with a bowl-rake classifier.

Each of the four raw mills is driven by a 350-hp. 180 r.p.m. 2200-volt high-starting torque synchronous motor. Primary mills rotate at 19 r.p.m. or 75 percent of critical speed and the secondary mills turn at 17 r.p.m. or 67 percent of critical speed. Liners used in these mills are rolled alloy steel plates which are held in place by bolted lifting elements 2½-in. high. Discharge end grates have slotted openings ⅞-in. wide in the preliminary mills and ⅜-in. wide in the secondary mills. These slotted openings are contained in an area extending 13 in. inwardly from the inside of the liners. Discharge of material must, therefore, be near the periphery, making these mills "low-pulp-level-discharge" type. Mills are carried on water-cooled babbitted bearings lubricated from a central pressure oiling system.

All machinery is electrically interlocked so that machines can be started only in the proper sequence—that is, in reverse order of the flow of materials through the circuit.

At an average output of about 45 net tons per mill hour, total power consumption for the entire raw milling department including mills, classifiers, thickeners, and auxiliaries is about 16 kw.h. per net ton, or 5 kw.h. per barrel. From 90 to 100 hours of raw mill opera-

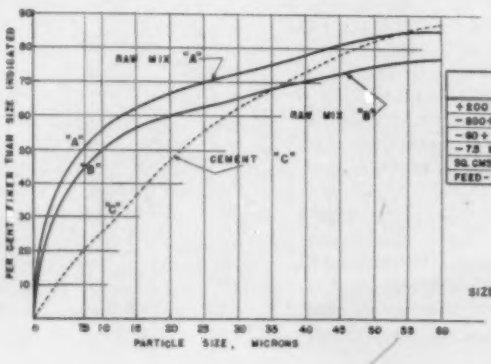


DESCRIPTION	% WATER	% + 28 MESH	% + 100 MESH	% + 200 MESH	SPECIFIC SURFACE	TONS PER HR	% CIRC. LOAD
A NEW FEED	3%	85%	92%	94%		90	
B MILL DISCHARGE	27%	54%	76%	88%		125	PRIMARY 150%
C RAKE SANDS	18%	90%	94%	96%		75	
D RAKE OVERFLOW	50%	18%	50%	60%	3100 #	50	
E MILL DISCHARGE	33%	2%	48%	73%		150	SECONDARY 300%
F BOWL SANDS	25%	7%	82%	90%		150	
G BOWL OVERFLOW	64%	0	0	10%	3200	50	

W = -200 MESH FRACTION

FIGURE 3

RAW GRINDING CIRCUIT
TYPICAL MOISTURES & FINENESSES



SUMMARY

	RAW MIX "A"	RAW MIX "B"	CEMENT "C"
+ 200 MESH	6.2%	13.0%	3.8%
- 200 + 325 MESH	8.6%	8.4%	8.9%
- 90 + 75 MICRONS	33.4%	32.1%	57.2%
- 75 MICRONS	51.8%	46.5%	30.1%
SQ. CMS. PER GM.	3498	3089	1740
FEED - NT PER HR	40	54	-

FIGURE 4

SIZE - WEIGHT DISTRIBUTION CURVES
RAW MIX AND CEMENT

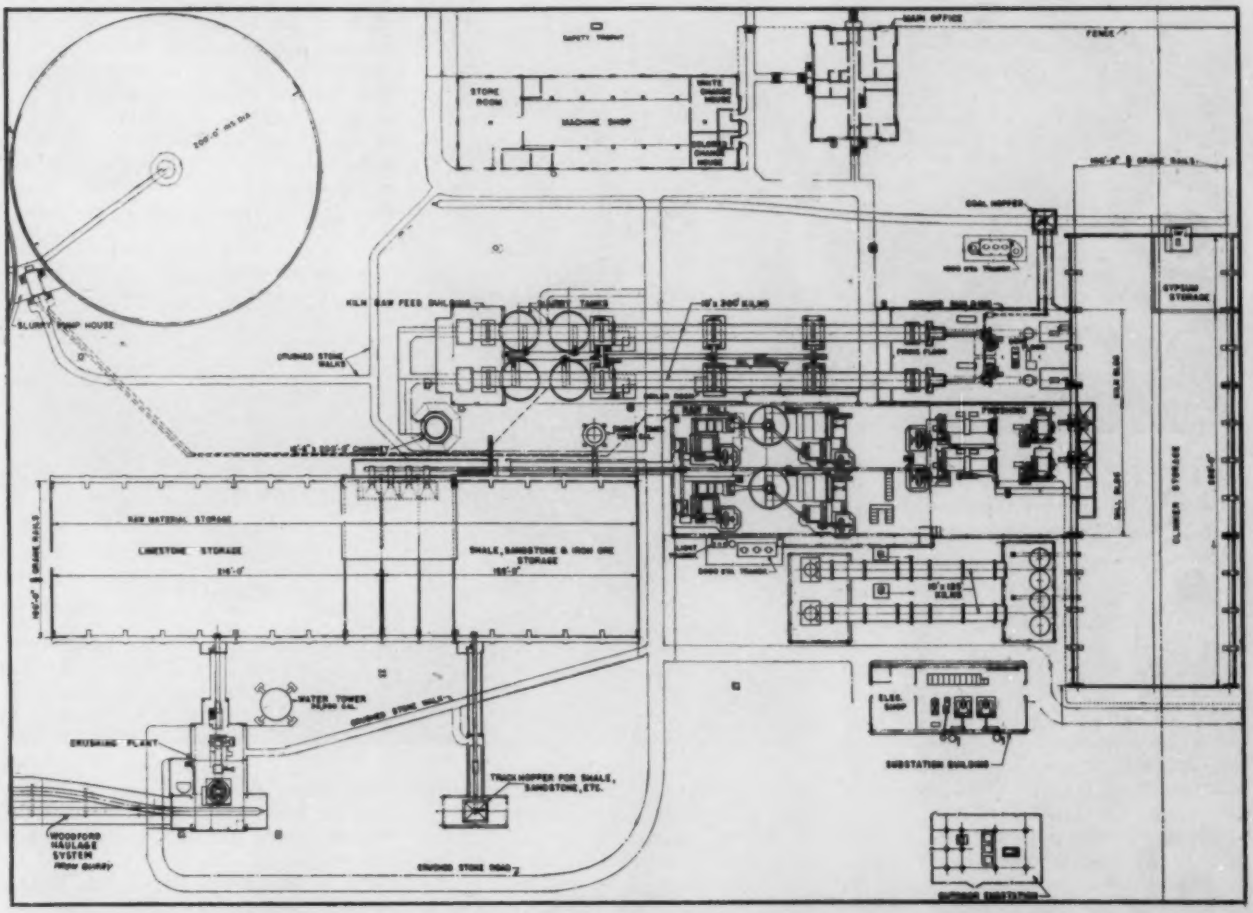


Fig. 1: General plan of Leeds, Ala. plant, Universal Atlas Cement Co. Stockhouses "A" and "B", not shown, are to the lower right in the complete plan.

tion will produce sufficient feed for seven days of continuous kiln operation.

The feed to the primary mill consists of the proportioned crushed rock, together with the circulating oversize or rake sands from the rake classifier. Primary mill discharge at 25 to 30 percent moisture dilution flows by gravity to the rake for first stage classification. Oversize sands settle out and are moved by two reciprocating rakes up an incline to a vibrating launder which delivers to a mill feed sump. Each rake assembly is 24 ft. long by 4 ft. wide and contains 8-in. blades. Rakes make 30 strokes per minute. The combined mill feed with further water addition is picked up from the sump by scoops and fed through a 24-in. dia. trunnion opening into the mill. The fines, diluted to 45 to 55 percent water, overflow the rake classifier through two annular openings in pulsations caused by the rake strokes and deliver to the bowl-rake classifier.

This overflow, along with secondary mill discharge at 30 to 35 percent dilution, is introduced to the center of the bowl. The coarser material settles to the bottom of the bowl, where rotating arms draw it to a center rectangular opening through which it drops into the secondary rake compartment below. Four reciprocating rake assemblies, each about 32 ft. long and 4 ft. wide with 8-in. blades, move these sands up an incline to a wheel elevator from which they are washed through a launder into the secondary grinding mill. There was a tendency for "critical size" or borderline material to accumulate in suspension in the bowl until the overbalanced condition caused it to drop in surges to the rake compartment. This surging, until controlled, resulted in uneven rates of feed to the secondary mill and probably in the production of excess slimes. This condition was improved by increasing the area of the center rectangular opening between the bowl and rake compartment along with the installation of water jets beneath this opening to wash down continuously any accumulated critical size material. The fine ground material overflows the peripheral weir of the bowl to a slurry pump sump.

The primary raw mills were originally loaded to 33 percent of volume with a graded charge of 4-in. to 2½-in. balls. The secondary mills were loaded to 36 percent of volume with a graded charge of 2-in., 1½-in. and 1-in. balls. Balls are added to each mill every operating shift to compensate for wear. Top size replacement balls are added by placing them into the feed scoops while the mills are operating. Original additions were made to each mill at the rate of ½ lb. of steel per net ton of new feed ground. After several months of operation it was found that actual steel wear in the primary mills was only about 1/10 lb. of steel per net ton of feed, while ½ lb. per net ton was found to be substantially correct to compensate for wear in the secondary mills. Primary and secondary mills are now operated with ball loads maintained at about 38 percent to 40 percent of volume. It is planned to make tests using different gradations of ball sizes.

The degree of classification and hence circulating loads and finenesses in various parts of the circuit are controlled primarily by water addition from spray lines. A variable speed drive on the radial bowl rakes provides additional control of fineness. This rotary speed may be varied from ½ to 1½ r.p.m. One set of sprays is installed over the upper end of the primary rake. Increasing the amount of water at this place

Above: Office is of architectural concrete. Right: Two slurry thickeners.

increases dilution, reduces the size of particles in the primary overflow, and hence builds up a larger circulating sand load. Two sets of sprays installed over the secondary sand rakes are used in a similar manner to regulate fineness of finished product and quantity of secondary mill feed. Additional water is introduced at the feed end of both mills to obtain proper grinding dilution and to flush the material into the mills. A small constant head surge tank is installed in the water supply system which serves the entire rock mill. This insures fixed water delivery for each valve setting. After the desired dilutions are established throughout the circuit the separate valves are left in adjusted positions and a master valve is used in shutting down or starting up the units.

Character of Ground Mix

Fig. 3 lists average finenesses and moisture contents obtained from tests made under normal operations. Because of the extreme flexibility possible with this circuit these figures may be varied considerably by changing the feed quantity and rate of water addition. However, results are consistent for constant feed rates and water valve settings.

It is generally believed that finer grinding of raw materials for kiln feed as measured by the 200-mesh sieve improves cement clinker quality and grindability. Little attention has been given, however, to the particle sizing below the 200-mesh range. In studying the operation of the new Leeds mill, it was found that a superabundance of very fine micron sizes was produced. This is detrimental from the standpoint of the additional work done to produce unnecessary slimes and because finer particles settle more slowly in the thickening basins, resulting in a higher moisture content of the thickened slurry. In addition to the excess water which must then be driven off in the kiln, the superfine material is believed to be unstable in its flow through the kiln, and larger quantities of this material are carried out of the kiln with the exit gases.

Theoretically, it would seem that an ideal kiln feed should all be finer than 60 microns (325 mesh) and all larger than say 10 or 20 microns. Greater mill feed rates and circulating loads have been found to be of some aid in reducing the amount of material finer than 7.5 microns. Grinding with the minimum practical dilutions also tends to reduce production of slimes. In the primary grinding circuit, circulating loads of 200 to 300 percent have been reached and it may be desirable to go still higher if it is mechanically possible. On the secondary side 250 percent to 350 percent circulating loads (which in this circuit are the total mill feed) have been obtained. Physical capacity of the grinding units and of the classifiers are the limiting factors controlling these loads. Some increase in milling capacity has been obtained by increasing the size of the slots in the primary mill discharge.

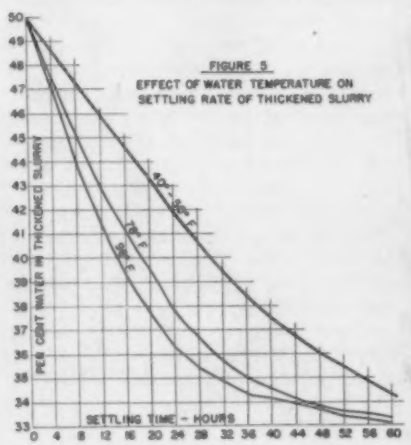


FIGURE 5
EFFECT OF WATER TEMPERATURE ON SETTLING RATE OF THICKENED SLURRY

Fig. 4 shows the size-weight distribution of finished raw materials for two different feed rates. A curve for cement (Curve "C") is also shown to illustrate the difference in grinding characteristics of the raw materials and the clinker burned therefrom.

Curve "B" on Fig. 4 represents finished product when grinding 35 percent more material than represented by Curve "A". A decrease in specific surface of about 10 percent resulted from production of less 7.5 micron material and more 200-mesh residue. Within the size range most desired (—60+15 microns) there was no change. In both cases the amount of material smaller than 7.5 microns was greater than the amount between 7.5 microns and 200-mesh. Thus a method of selective grinding to reduce substantially the amount of these ultrafines without increasing the 200-mesh residue still remains an open problem.

Determinations of size-weight distribution along with the total specific surface in sq. cm. per gram were made with a Wagner turbidimeter. This instrument is in general use in the cement industry for determining cement fineness, but has only recently been adapted to raw mix.

The calculation of specific surface involves the assumption that the average particle size of each fraction is the

mean of the limiting sizes. Hence the minus 7.5 micron fraction is assumed to have an average particle size of 3.75 microns. Because of the large proportion of minus 7.5 micron material in this product this assumption may be considerably in error and may introduce appreciable errors in the calculation of total specific surface. For this reason results from a turbidimeter may not be directly comparable with results on the same sample made with a sedimentation balance, although tests should be comparable with one another. Preliminary investigations of the Leeds ground materials indicate that the average particle size of the minus 7.5 micron fraction may be nearer to 2.6 microns than to the assumed 3.75. Specific surfaces shown in Figs. 3 and 4 are based on the 3.75 average.

Thickening

The finished raw material overflowing the bowl classifiers at 84 to 86 percent dilution is pumped to the thickeners. Two 3500 g.p.m. rubber-lined centrifugal pumps are provided for this purpose. each of which can handle the full output of the two grinding circuits. Valves on the operating pump are cracked so that the rate of pumping equalizes the rate of production, which enables maintenance of a constant sump level with little manual attention.

There are two 200-ft. dia. torque thickeners each with a capacity of about 10,000 net tons (about 32,000 bbl.) of ground solid material (dry basis). The thickeners are 10 ft. deep at the sidewalls and 20 ft. deep in the center. The floor slope is 2 in. per ft. for 40 ft. from the center and 1-in. per ft. from this point to the periphery. Two thickeners were installed so that when a special type of cement is to be made, the mills may grind the special mix for delivery to one thickener while the kilns are drawing standard mix from the other and vice versa. The raw mill stream is discharged to a distribution box located between the thickeners. From this box it may be delivered into either of two wooden launders which discharge at the center of each thickener. An automatic sampler installed in the box is used for hourly chemical control of the mix.

Material settling to the sloped bottom of the thickener is slowly raked toward the center by two long rake arms which have no blades within the 80-ft. diameter at the center of the thickener, and by two short rake arms which extend only within this 80-ft. diameter. These arms rotate at about 1¼ revolutions per hour and are powered by a 5 hp. vertical motor through a heliocentric drive. The operation of the mechanism is so smooth that the power required is negligible even with a full load of material in the thickener. In case of overload the increase in torque automatically raises the long rakes to prevent possible stalling. Each of the two long rake arms carries a motor-driven, 200 g.p.m. rubber-lined, recirculating pump housed in a water-tight box. Gland water for these pumps is drawn by auxiliary 1-in. water pumps from the thickener surface water through inlet pipes carried on floats. The recirculating pump inlet pipes normally draw thickened slurry from the center cone at the bottom of the thickener. Their discharge lines are carried on the long rake arms. One line delivers about one-third of the way out from the center and the other delivers about two-thirds of the way out. Desired blending is accomplished by this method of recirculation but some dilution of the thickened slurry may also result by this method.

Since kiln requirements for seven days are satisfied with four or five days of grinding there are two to three days each week during which no new slurry is delivered into the thickener. Free settling conditions generally prevail, hence the coarser particles which are generally higher in lime and silica settle near the center of the thickener and the finer particles higher in alumina settle nearer to the periphery. Following a raw mill shutdown, moisture content, 200-mesh fines, and specific surface of the thickener underflow generally start to rise. This may continue until some hours after the raw mill is again pumping freshly ground slurry to the thickener, when the reverse trend sets in. The amount of variation depends on the total tonnage in the thickener and/or the rate of delivery of thickened slurry to the kiln tanks. This cycle is due to size segregation caused by the more rapid settlement of the coarser particles which are the first to be drawn off from the center cone. The recirculating pumps when operating as intended for blending purposes are moving some of this thickened slurry to mix with the finer materials farther out in the thickening basin. This tends to increase dilution of the underflow.

The temperature of the water has a marked effect on the settling properties of the material. This was quite noticeable with the advent of cold weather during the latter part of 1938. Fig. 5 shows graphically results of laboratory settling tests of Leeds slurry at three different temperatures.

Uniform moisture content and fineness of slurry drawn from the thickener for feed to the kilns is necessary from the standpoint of uniform kiln operation since there is no dewatering between thickeners and kilns in this installation. One method of obtaining close uniformity would be a continuous raw grinding operation at reduced production so that the thickener is fed at about the same rate it is drawn. This type of operation, however, is uneconomical for obvious reasons. Average daily moisture contents of thickened slurry have shown variations from 34 to 42 percent water. Based on improvements which have been made or are planned, it is expected that it will be possible to control this dilution to a deviation of 1 percent or less from the mean. For the fineness characteristics of material now being ground the mean is about 36½ percent moisture.

The recirculating pumps on one thickener have been equipped experimentally with movable inlet and outlet pipes. These permit drawing the slurry from any desired level at the center,

(Continued on page 55)

Limestone quarry showing electric shovel loading electrically-propelled car which receives its source of current from a third-rail.

Some of the highlights of the National Sand and Gravel Association and National Ready-Mixed Concrete Association conventions: (1) L. P. Price, from Honolulu, T. H., who came the farthest distance (ready-mix concrete); (2) Interested listeners; (3) Joe L. Shiely, St. Paul, Minn., presides; (4) Round-table discussions in full blast; (5) M. P. Greer, Marquette Cement Manufacturing Co., accepts trophy won by its Wolf river sand and gravel plant, Tennessee; (6) and (7) Convention in session; (8) Alex. Foster in a studious mood; (9) None other than the veteran V. O. Johnston, past-president; (10) Secretary Ahearn and Chairman Berger of the Manufacturers' Division; (11) Frank H. Jackson, U. S. Bureau of Public Roads; (12) Harry S. Davison, general treasurer of the National Sand and Gravel Association; (13) Mr. and Mrs. Stepanian, Columbus, Ohio; (14) A huddle; (15) Ray V. Warren, secretary, Western Pennsylvania Sand and Gravel Association; (16) H. N. Snyder, Buffalo Slag Co., sits between Mrs. and Mr. H. H. Hughes, U. S. Bureau of Mines; (17) W. A. Bliss and W. A. Bliss, Jr., Pittsburgh, Penn.; (18) George Jacoby, Helena, Mont.; (19) Irving Warner, Philadelphia, and Frank Gautier, Los Angeles; (20) Col. John M. Settle, Louisville, Ky.; (21) John Redd, Washington, D. C.; (22) Jack Owens and Anderson Dana; (23) Paul P. Bird and John Prince

Sand and Gravel Convention Reports Point to Better Business In 1939

Large Attendance at Meetings Held Jointly With National Ready Mixed Concrete Association

J. Rutledge Hill, pres., N. S. & G. A.

A program bristling with live subjects and a belief that business in 1939 should be definitely better than it has been for some years were responsible for the attendance at the conventions of the National Sand and Gravel Association and the National Ready Mixed Concrete Association held at the Netherland Plaza Hotel, Cincinnati, Ohio, from January 25 to 27. The Lime Putty Products Association also took advantage of the fact that many of its members would be present and held a special "round table" meeting. The Ohio Sand and Gravel Association and the Ohio Ready Mixed Concrete Association also met to discuss their local problems.

James F. McCracken, pres., N.R.M.C.A.

St. Louis Wins 1940 Convention

St. Louis, Mo., will be host to the 1940 convention of sand and gravel and ready mixed concrete producers, on January 24 to 26, inclusive. The Jefferson Hotel will be convention headquarters. It was also decided to have an exhibit.

At the opening session of the 1939 conventions on Wednesday, January 25, Mayor James G. Stewart of Cincinnati welcomed the delegates, and in his talk touched upon some of the problems of the heavy-goods industries. President J. Rutledge Hill, of the National Sand and Gravel Association, and President James F. McCracken, of the National Ready Mixed Concrete Association, gave brief addresses at the joint meeting which started off the convention program. The story of the convention proceedings and discussions will appear under various pertinent subjects to make it easier for the reader to secure a summary of the large fund of information presented at the sessions.

All officers of the National Sand and Gravel Association were reelected: President, J. Rutledge Hill, Gifford-Hill and Co., Inc., Dallas, Texas; vice-president, Paul P. Bird, Boston Sand and Gravel Co., Cambridge, Mass.; secretary-treasurer, H. S. Davison, J. K. Davison & Bros., Pittsburgh, Penn. The officers and the following compose the executive committee: Chas. M. Cadman, Pacific Coast Aggregates, Inc., San Francisco, Calif.; M. A. Neville, Western Indiana Gravel Co., Lafayette, Ind.; George W. Renwick, Chicago Gravel Co., Chicago, Ill.; and J. M. Settle, Ohio River Sand Co., Inc., Louisville, Ky.

The Manufacturers' Division also reelected its officers and directors who are as follows: Chairman, J. Fennell Berger, John A. Roebling's Sons Co., Trenton, N. J.; vice-chairman, F. E. Finch, Hardinge Co., York, Penn.; Delbert Kay, Nordberg Manufacturing Co., Milwaukee, Wis.; M. S. Lambert, Robins Conveying Belt Co., Chicago, Ill.; A. A .Levison, Blaw-Knox Co., Pittsburgh, Penn.; Bruce G. Shotton, Hendrick Manufacturing Co., Pittsburgh, Penn.; and L. W. Shugg, General Electric Co., Schenectady, N. Y.

No changes were made in the officers and directors of the National Ready Mixed Concrete Association who are as follows: President, James F. McCracken, American Builders Supply Co., Louisville, Ky.; vice-presidents, Jos. H. Dixey, Transit-Mix Concrete Co., Inc., New York, N. Y.; H. F. G. Pelsue, Graham Bros., Inc., Los Angeles, Calif.; R. B. Young, Ontario Ready Mix Concrete, Ltd., Toronto, Ont.; secretary, A. J. O'Connor, Koenig Coal & Supply Co., Detroit, Mich.; treasurer, Stephen Stepanian, The Arrow Sand and Gravel Co., Columbus, Ohio; past presidents, Alexander Foster, Jr., Warner Co., Philadelphia, Penn.; H. F. Thomson, General Material Co., St. Louis, Mo.; and J. L. Shiely, Guaranteed Concrete Co., St. Paul, Minn.

Ohio Producers' Meeting

OHIO SAND AND GRAVEL ASSOCIATION held its annual luncheon business meeting at Cincinnati while the annual convention of the National Sand and Gravel Association was in progress. W. E. Hole, American Aggregates Corp.,

A candid "shot" of the merry-makers at the buffet supper, National Sand and Gravel Association convention

Greenville, was reëlected president. The other officers, also reëlected, are J. J. Gorman, Zanesville Gravel Co., Zanesville; J. H. Evans, Sturm and Dillard Co., Columbus; and Claude L. Clark, executive secretary.

Mr. Clarke, in his report, commented briefly on business conditions and prospective business for 1939, which he expected to equal that for 1938. He said that PWA will take a large volume of the production in 1939. Less than one-half of the 503 projects approved by PWA, to total over $104,000,000, are under contract and the remainder soon will be let, according to Mr. Clark. Another optimistic prospect is to be WPA, with about 80 percent of the workers in the construction division assigned to road construction projects. The state highway department is to spend $26,000,000 for new highway work in 1939 and $13,000,000 for highway maintenance. During 1938, two-thirds of the gasoline and vehicle taxes collected were diverted, according to Mr. Clark.

The committee on specifications reported on new developments in the requirements for aggregates. Some discussion was had on the specifications for 100 percent crushed gravel, which apply for certain types of construction. An important change in the concrete sand specification for state work, which is likely to affect many of the producers, is a requirement for more fines. The revision provides for 10 to 25 percent minus 50-mesh material where 5 to 25 percent was the former requirement.

An amendment was passed by unanimous vote to establish associate memberships for which manufacturers of equipment and other concerns who sell to the industry are eligible.

Business Conditions and Outlook

Several outstanding addresses were presented at the National Sand and Gravel Association and National Ready Mixed Concrete Association meetings on various aspects of business, particularly as they relate to producers of sand and gravel and ready mixed concrete. These meetings were presided over by J. Rutledge Hill, president of the sand and gravel producers association, and James F. McCracken, president of the ready-mixed concrete group.

Who Foots the Bill for Our Highways

Chester H. Gray, director of the National Highway Users Conference, Washington, D. C., in his address at the opening session, contended that the highway user was more than bearing his proper share of the cost of building and repairing highways. He said that motor vehicle user taxes in 1937 exceeded $1,525,000,000 and that federal, state and municipal gasoline taxes now are approaching the annual total of one billion dollars. Trucks alone in 1937 paid in taxes of various kinds over $417,500,000.

Contrary to generally believed statements, highway users are very rigidly regulated by the I.C.C. by authority of the Motor Carrier Act of 1935. He said that it was not true that the nation was plunging into an overwhelming highway debt, and to back up his statement he pointed out that from 1928 to 1937 there was, with one or two exceptions, a gradual reduction in state highway bonds issued annually. Since 1933 annual interest payments on state highway obligations have shown a trend downward, and from 1928 to 1937 highway bonds have decreased in amount from $1,500,000,000 to $1,180,000,000.

Construction Outlook and Opportunities

Thomas S. Holden, vice-president, in charge of statistics and research, F. W. Dodge Corp., gave a very illuminating picture of the trend in construction since 1928 and the outlook for 1939. He said that in spite of the setback of late 1937 and the early months of 1938, last year's construction contract expenditures ran nearly 10 percent ahead of 1937. The 1938 total was the largest since 1930 and the December total was the largest for the closing month of the year since 1928. From a depression low of $1,256,000,000 in 1933, the Dodge record of total contracts in the 37 Eastern states climbed to $3,197,000,000 in 1938.

Commenting on current legislation in Congress now being debated, he expressed the belief that some long-range public works policy will be adopted to supplant emergency progress. This proposal is for Congress to set up a National Long-Term Credit Commission with the object of co-ordinating long term financing in such a way as to inspire complete confidence in its workings and to release a more or less continuous flow of money into needed public and private construction.

Mr. Holden defended the construction promotional activities of the federal government, functioning through the F.H.A. and the U.S.H.A., Federal Home Loan Bank System and the Farm Credit Administration, as a means of "transforming an outworn pawnbroking system into a long-term credit system." He pointed out, for example, that the F.H.A. is neither a spending nor a lending agency, but draws out private funds for mortgage investment. Factors which will influence heavy expenditures for construction during 1939, are the continuance of expenditures by the United States Housing authority for public subsidized housing out of the loan fund of $800,000,000; the potential expansion program of public utilities; housing projects of the insurance companies, such as, the $100,000,000 investment funds of Metropolitan Life Insurance Co., and increased residential, commercial, and industrial building.

Statistics indicate that the first half of 1939 will show a considerable gain over the same period last year with a slight tapering off of activity in the last half of the year. Estimates for 1939 point to the following increases: factory building, 95 percent; commercial building, 33 percent, residential building, 32 percent; decreases—public and institutional buildings, 15 percent; heavy engineering expenditures, 12 percent. These figures would give a general increase of 20 percent in total dollar volume of contracts for buildings and a net increase of about 8 to 10 percent for total construction. The estimated 1939 dollar total for all construction in 37 eastern states, as covered by Dodge, is $3,500,000,000 compared with $3,197,000,000 for 1938. Within the category of heavy engineering work, moderate increases may be expected in electric utility construction, approximately the same highway volume as last year, and decreases in other types of engineering work.

Business Conditions In Sand-Gravel and Ready Mixed

V. P. Ahearn, executive secretary, presented a review of business conditions as summarized from replies to a questionnaire sent to producers. These replies indicated that the volume of sand and gravel and ready mixed concrete business in 1938 was about 10 percent lower than the preceding year, although the final report of the Bureau of Mines may show that there was a decline in volume of about 5 percent. However, Missouri, Texas, and Michigan showed increases over 1937, California was about the same, and there were substantial declines in Illinois, New York, Ohio, New England, western Pennsylvania, and Kentucky, but with the largest decline occurring in the Rocky Mountain states. The prospective market in 1939, it is anticipated, will be

larger in every area than it was last year, the total increase expected being 15 percent. The Southwest will be satisfied if it does as well as last year, and western Pennsylvania and the Rocky Mountain territories are looking for large increases in volume. Prices were relatively stable with slight increases in some sections to compensate for increased taxes and labor costs. Demand for sand and gravel and ready mixed concrete represented not more than 50 percent of capacity. Highways and streets formed the basis for the largest demand in 1938, but there were surprisingly good increases for large industrial structures and housing. California reported the best market came from large industrial structures and large public buildings with housing construction particularly strong in southern California. Northern Missouri had its best market from large public structures, exceeding highways and streets, and in the Denver area large industrial structures and public buildings formed the most active market. Railroad ballast markets were weak in every section. Apparently 75 percent of the market came from public works as compared with 25 percent for privately financed projects, the percentage of public works running in western Pennsylvania to 90 percent of the total. Missouri and southern California, however, were exceptions where 65 percent of the market came from privately financed work. Practically all public works are in part financed with federal loans or grants.

Sand and Gravel Output and Outlets

H. HERBERT HUGHES, mineral economist, Bureau of Mines, showed the trends in production, markets, and prices of the various branches of the sand and gravel industry and comparisons with other industries by slides of graphs and tables. Production curves indicated that while business as a whole in 1938 was off 22 percent as compared with 1937, commercial production of sand and gravel was off not more than 10 percent. Iron and steel output and automobile production contributed to the general business decline with decreases of 44 percent and 48 percent, respectively; fuel production dropped 13 percent for anthracite, 14 percent for bituminous, and 5 percent for petroleum. Only gold among the metals showed an increase of 6 percent.

On the other hand, the industries comprising the principal outlets for sand and gravel presented a somewhat better situation. Contract awards reported by F. W. Dodge Corp. increased 10 percent over 1937; engineering construction contracts advanced 14 percent, according to *Engineering News-Record;* Portland Cement Association figures indicate an increase of 5 percent in concrete pavement contracts; Bureau of Mines data reveal a drop of about 8 percent in cement shipment and an increase of 5 percent in domestic demand for asphalt. Glass manufacturers reported a drop of 56 percent in plate glass output in 1938 and glass containers declined 18 percent. Bureau of Census figures indicate a drop of 50 percent in production of malleable castings, while the American Railway Association data show a 20 percent decline in carloadings. While in the first half of 1938 industrial production was considerably below 1937, the second half was almost an exact reversal of the decline in 1937. Curves showing comparative markets since 1929 indicate that construction contracts and concrete pavement contracts fell to lower levels than sand and gravel. Increased demand for gravel in bituminous roads balanced in part the drop in demand for aggregates in concrete pavements.

In the matter of prices, commercial gravel average prices since 1923 have varied only 2 or 3 cents a ton above or below 60c a ton, while crushed stone has dropped from more than $1.00 a ton to around 90c. The trend of cement prices has been downward.

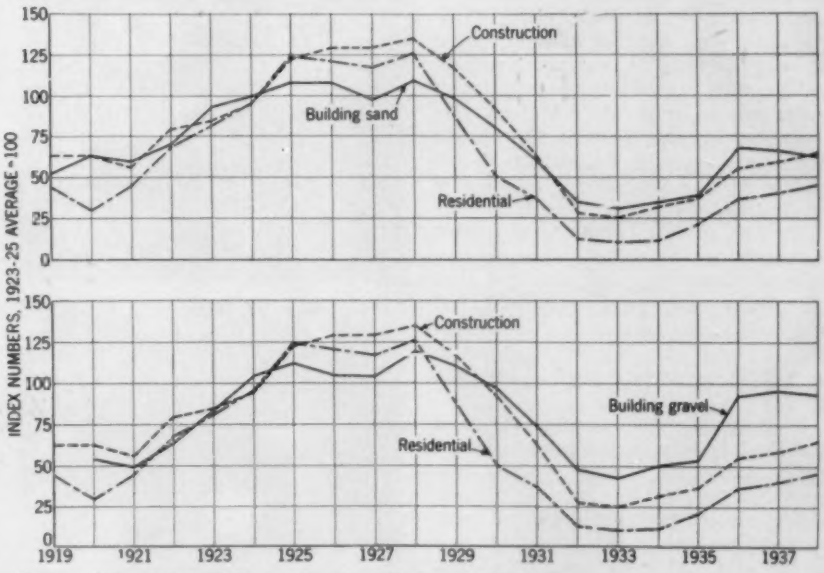
Turning to the future, Mr. Hughes said that one nationally-known economist expected that the average volume of business in 1939 would be around 20 percent above the 1938 level, basing his prediction in the belief that building is on the threshhold of a boom. John H. Fahey of the Home Loan Bank Board believes that residential construction in 1939 will approach the 1929 level. F. W. Dodge Corp. reports that a drop in public works and utilities in 1939 will be more than counterbalanced by increases in nonresidential and residential building. The net result is expected to be an increase of 8 percent in total construction.

A Business Man Looks At Modern Conditions

COL. WILLARD T. CHEVALIER presented one of the outstanding talks, "A Business Man Looks at Modern Conditions," before a joint session of the National Sand and Gravel Association and the National Ready Mixed Concrete Association. He said that there are two types of business upon which the American business depends on a fifty-fifty basis. The first, consumption, or replacement, business, which involves the taking care of everyday needs; the second is that which provides for growth and expansion and involves new things and new facilities.

Col. Chevalier said that business, particularly the capital-goods industries, is suffering from a lack of the second type of business and that the American business man has lost the capacity to be interested in what is to take place a few years ahead into the future.

He anticipated a revival of business in the Spring and a reasonably good second half of the present business year provided war is averted in Europe.



From statistics of Federal Reserve Board and Bureau of Mines

Curves showing commercial building sand and building gravel production compared with total construction and residential construction contracts awarded, 1919 to 1938

Research, Specifications and Operating Problems

F. H. Jackson, senior engineer of tests, U. S. Bureau of Public Roads, in discussing "Highway Research Affecting Aggregates", told the whys and wherefors of certain specifications that have seemed troublesome to some producers.

Mr. Jackson, speaking as a representative of the consumer group, said that present trends in aggregate specifications are the result of accumulated experience and the findings of laboratory research which indicate to engineers that rigid requirements are necessary, even though processing becomes more expensive.

In commenting on research in general, Mr. Jackson said that the results of highway research have been disappointing, and that there has not yet been developed a coördinated program and that most of the research done has been initiated in order to solve some local problem such as the control of soft and nondurable fragments in states where the problem has been acute.

He suggested that it is becoming increasingly evident that the effect of grading and possibly other characteristics such as mineral composition on volume change has not been given sufficient consideration in the past.

In discussing gradation, Mr. Jackson said that in a typical specification the range in the permissible percentages of material allowed to pass a given sieve is entirely too wide when applied to the product of a single plant. Wide variation in sand gradation, even though permitted in a general specification, seriously affects the amount of water needed to maintain a given concrete consistency. That is the reason for insertion of a uniformity clause, which Mr. Jackson believes to be a step in the right direction.

Control in the grading of coarse aggregate is to become more precise. Several states are now requiring that the coarse aggregate be shipped and stored in two separated sizes, which Mr. Jackson also believes contributes to a more accurate control of concrete quality.

In discussing fines in concrete sand and the tendency to require more material to pass a No. 50 sieve, he said that engineers feel that the increased workability insured by the presence of from 10 to 15 percent of this particular size in the mix will more than offset the slight loss in strength which may result. This is particularly true with the newer high early strength cements where there is a steady pressure to reduce the cement content.

In considering recent developments in specifications from the standpoint of more closely controlling the quality of sand and gravel, Mr. Jackson discussed accelerated soundness tests, sodium and magnesium sulphate, and mentioned cases where these tests are waived when the aggregate can show a satisfactory service record. It is Mr. Jackson's opinion that there is a lot of uncertainty as to the real significance of soundness test results and that the correlation of the results of tests with service behavior have not proved successful due to inadequacies in the test procedure and other factors which influence the durability of concrete.

(1) Lion Gardiner, center, Stanton Walker, right; (2) L. W. Shugg, director of exhibits, right; (3) Harry H. Stewart uses his candid on the (4) gamesters below.

He pointed out that the durability of an aggregate in service depends as much on the kind of concrete in which it is used as on the material itself and suggested the necessity of a satisfactory method of determining the amount of volume change of the aggregate particle itself in order to control the use of aggregate which exhibits marked volume change due to temperature or moisture variations.

For concrete pavement construction, Mr. Jackson said that wear tests for concrete gravel were not emphasized any longer because a coarse aggregate which is satisfactory from the standpoint of soundness ordinarily will be sufficiently resistant to wear. The Los Angeles abrasion test will be, in his opinion, of distinct value as a measure of the suitability of aggregates for bituminous work, and for concrete an aggregate having a percentage of wear as high as 50 or more should be satisfactory provided its soundness is unquestioned.

He congratulated the industry on its efforts to eliminate deleterious materials by the introduction of soft stone eliminators and emphasized the desirability for specifications limiting the maximum amounts of each specific material in question. A satisfactory test for soft fragments is urgently needed, said Mr. Jackson.

In commenting on tests for the quality of fine aggregate, he said that the "structural strength test" now standardized by the American Association of State Highway Officials and the American Society for Testing Materials is an improvement over the old strength ratio test since it theoretically takes care of the effect of grading. Its shortcoming is that it does not take into consideration mineral composition, surface texture, etc., which affect the strength which will be obtained with any given water-cement ratio.

Soundness tests on sand have many variables which make it difficult to use the test intelligently. The effort of New York State to control soundness by the so-called "rational analyses" was described. A typical specification of the type is one limiting the percentage of kaolin to not more than 6 percent and the percentage of quartz plus feldspar to not less than 75 percent.

For bituminous construction, Mr. Jackson suggested a need for research to determine more definitely the best way to use sand and gravel, since natural gravel is at a handicap because of its rounded surfaces. The current A. A.

S. H. O. specifications permit gravel provided at least 50 percent of the material retained on the No. 4 sieve shows at least one fractured face.

His paper was concluded by suggesting lines along which future research will follow. Among the differences in aggregate characteristics which influence the behavior of mixtures, and which need study, are the mineral composition of material, its thermal characteristics, its tendency to change in volume with change in moisture content, its surface texture and its angularity (for bituminous mixtures).

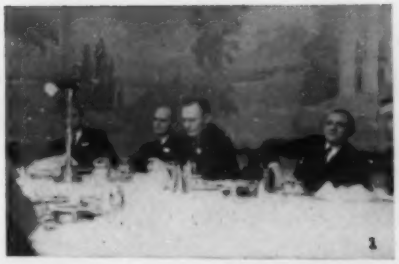
Round Table Discussion

Mr. Jackson's paper afforded a background for an interesting informal round table discussion by outstanding operating men on aggregate specifications and their effect on operating problems.

J. L. SHIELY of the J. L. Shiely Co., St. Paul, Minn., who led the discussion, said that in his operations where there is a surplus of smaller sizes of gravel, an attempt is made to sell strength concrete by agreement with local engineers so that more than the usual quantities of fine material may be used with a slight addition of extra cement. This is an attempt to balance the plant production. He pointed out that in many instances with a given specification the saving of cement is of little consequence in comparison with the cost of producing the aggregates.

IRVING WARNER of the Warner Co., Philadelphia, Penn., discussed the production of three gradings of sand by his company for three distinct specifications and the differences in gradation which affect operation. He pointed out that there is a definite trend toward less of the plus ¼-in. material and more of the minus 50-mesh and some minus 100-mesh material. The production of such material leaves an excess of ¼- to ⅜-in. grit which accumulates unless a demand is found for it. Mr. Warner suggested that it might be economically practical to reduce this excess grit to fine material to bolster the 100-mesh sand sizes required. He said that tests of waste wash-water had indicated but a very small loss of extreme fines, which had practically no effect on this gradation, indicating that in the future producers will likely be faced with the necessity of manufacturing fines in order to meet specifications. This may become necessary, said Mr. Warner, in order to produce a product comparable with stone sand in the matter of uniformity.

J. R. THOENEN, of the U. S. Bureau of Mines, suggested time studies of various operations as a possible method of arriving at more economical production



(1) Manufacturers' Division, National Sand and Gravel Association's luncheon and business meeting; (2) Max Lambert addresses meeting; (3) Bruce Shotton enjoys some remark; (4) C. S. Huntington and J. F. Berger, chairman of the division.

costs, judging from reports derived from a field study conducted by the Bureau of Mines. In a study of 22 plants it was found that loading shovels were delayed by haulage equipment to the extent of 30 to 60 percent of their operating time. Likewise, haulage equipment was delayed at the loading and discharge ends about 35 percent of its possible hauling time. There was only about seven percent delay on haulage equipment from causes other than loading and dumping.

E. J. NUNAN, Buffalo Slag Co., Buffalo, N. Y., discussed the method of rational analysis used in New York State and its effect on production. This specification, which sets an upper limit of 6 percent for kaolin and a lower limit of 75 percent for quartz plus feldspar for fine aggregate used in the top 2½ in. on concrete pavement, was designed for construction of roads in the northern part of the state where there had been evidence of disintegration and surface scaling.

Mr. Nunan said that in the light of his experience nothing could be done toward meeting this specification if the requirement was lacking in the pit. He expressed an opinion that the specification would not be made statewide, because practically every sand in the state would be thrown out.

Ready-Mixed Technical and Operating Problems

ONE OF THE SEPARATE SESSIONS of the National Ready Mixed Concrete Association, devoted to reports of the technical committees and the treatment of technical and operating problems, developed into a lively discussion of operating practices and methods of controlling the quality of central-mixed and plant-mixed concrete.

R. B. YOUNG, Toronto, chairman of the Joint Technical Committee, gave a progress report on what was being done in developing specification standards, among them being the adoption by A.S.T.M. of a revised specification as standard. The American Association of State Highway Officials is developing a specification for ready-mixed concrete along similar lines, said Mr. Young.

Another committee has been recently organized to outline a method for sampling ready-mixed concrete and to develop a test procedure for investigating the efficiency of truck mixers and agitators. Another offer for extending research has been made by the American Concrete Institute, which has volunteered to organize a ready-mixed concrete committee if the Association will suggest a definite problem for study, said Mr. Young. Lion Gardiner, H. F. Thomson and R. B. Young, incidentally are now members of the board of the A. C. I. and other members of the Association are on the committee on Measurement, Mixing and Placing.

Mr. Young concluded his report with a few remarks concerning efficient operation. He questioned whether producers were making sufficient use of information published in the technical press as an inexpensive way of keeping customer contacts. "Are we making use of the data being obtained in our control tests of concrete to further customer confidence or to improve our own mixes or methods?" asked Mr. Young. He also questioned whether truck operations are carefully planned, whether the industry has learned anything from the concrete manufacturing methods in use on

the big governmental projects and whether the industry is in danger of losing its leadership through the substitution of careless methods for modern, well-equipped operations.

H. F. THOMSON, St. Louis, Mo., chairman of the Standards Committee, said that a provision had been recommended by a subcommittee that the mixing time with revolving drum type equipment shall start after all materials are in the drum. He quoted from Stanton Walker's report to the board of directors, to emphasize the growth of the industry, wherein Mr. Walker had said that only three states do not have highway specifications including ready-mixed concrete.

Mr. Thomson emphasized the importance of quality and said that the delivery of ready-mixed concrete is not an alternate way of delivering materials but that ready-mixed concrete is a manufactured product and the obligations of a manufacturer must be assumed.

Cold Weather Concrete

R. B. YOUNG was called upon to lead the discussion of "Cold Weather Concrete—from the Point of View of the Producer and Consumer," in reply to pre-assigned questions. According to Mr. Young's experience, the temperature at which concrete should be delivered should not exceed 80 to 85 deg. F. when used for structural frames and should not exceed 50 deg. F. for mass construction. He suggested 160 deg. F. as the best temperature for the mixing water in cold weather and recommended that aggregates be heated just enough to defrost them.

On large jobs, it has been the practice of Mr. Young's concern to depend on the heat in the sand and water entirely to heat the concrete, without applying heat separately to the coarse aggregate. If the aggregates are properly defrosted, he stated that practically all necessary heat can be applied in the mixing water for temperatures as low as zero.

Mr. Young believes that live steam is the best method of introducing heat into the aggregates because of its ability to rise through the interstices between the fine and coarse aggregate and to give up the rest of its heat upon condensation and its return by gravity. The bulk of the work is done in Canada by heating in stockpiles rather than in bins.

HENRY BECKLEY, The Beckley and Myers Co., Springfield, Ohio, in commenting on heating by live steam in bins, said that the increase in moisture content becomes fairly constant and that less difficulty is then experi-

(Continued on page 77)

Federal Legislation and Its Effect On Industry

Legislative problems faced by industry in general were discussed by several speakers at the conventions of the National Sand and Gravel Association and National Ready Mixed Concrete Association, and Executive Secretary V. P. Ahearn covered the more practical phases of the problem as it directly affects the aggregates industry.

Technique of Investigating the Business System

EDWIN B. GEORGE, economist, Dun & Bradstreet, Inc., New York, N. Y., in his talk about the Temporary National Economic Committee, recently set up by Congress to survey the entire national economy, urged business to coöperate in making the work of this committee of real value to the country. Only through this sort of coöperation between business and government can any good be expected to flow from a survey of this kind.

Mr. George expressed the belief that those responsible for the inquiry have made a brave effort to live down the epithet of monopoly hunters. Everyone is agreed that cyclical fluctuations have become increasingly violent, and their primary consequences are idle men and idle capital. The secondary consequences are misery and latent dissatisfaction with an economic system that for the most part has served us well. He said that this challenge is not to be turned aside by exaggerated accounts of business sin in the hands of theorists or a parading of its virtues by industry. The fundamental problem is not who is wrong but what is wrong. Mr. George listed 10 points with which the committee would probably deal, including price fixing and private controls over competition, changes in anti-trust laws, big business versus smaller business units, and low utilization of productive capacity.

Secretary Reports

V. P. AHEARN'S report to the National Sand and Gravel Association was a very complete review of the activities of the association staff and the legislative and business factors influencing the sand and gravel business. He estimated that the total output and value of sand and gravel in 1938 would approximate the results in 1937, when production was 189,660,423 tons, valued at $97,472,997. Secretary Ahearn pointed out that F. W. Dodge reports indicate that construction contracts in 1939 may reach $3,500,000,000 in 37 eastern states, due to increased volume in public and private residential building, commercial and factory building, and public utility construction. The railroad ballast market continues at a low level, but with so much deferred maintenance it is anticipated that this market may show some substantial gains. During 1938, highway building resulted in the improvement of 15,345 miles of road, exceeding the average for the past 10 years. Authorization for federal aid roads total $158,000,000 in 1940 and $191,000,000 for 1941.

All companies were urged by Secretary Ahearn to enter the annual sand and gravel safety contest. He pointed out that the greatest accident-frequency had occurred at dry bank operations and the lowest accident-frequency at lake deposits. The trophy winners were the Wolf River plant of the Marquette Cement Manufacturing Co., and the Dividing Creek plant of the South Jersey Sand Co.

Secretary Ahearn reviewed the question of labor relationships in the sand and gravel industry, dwelling upon the problem of the boycott technique in forcing contractual agreements. He also touched upon the situation of the industry with respect to the Walsh-Healey Public Contracts Act. The sand and gravel industry has agreed to a joint determination of prevailing minimum wages with the crushed stone and slag industries. With regard to the Federal Wage and Hour Law, the matter of seasonal exemption and the provision for exemption of seamen are problems which have been considered by the association and presented to the Administrator for interpretation.

He referred to the possibilities of an enlargement of the Social Security Act to increase the benefits and to include classes now exempt from its provisions. The latter amendment would probably bring sand and gravel employes engaged in work on navigable waters within the provisions of the act. Efforts will probably be made to eliminate the WPA or consolidate its activities with PWA, which is a more popular activity.

Executive Secretary V. P. Ahearn's report to the National Ready Mixed Concrete Association told about the

plans for a joint promotional program with the Portland Cement Association to develop new markets for ready mixed concrete. The report on the labor situation revealed that an attempt had been tried in two cities to enforce the demand of the operating engineers for the placing of one of its members on each ready mixed truck, but when the Lapp decision of the A. F. of L. was brought to the attention of the interested parties, the engineers withdrew their demands. An attempt had been made by the Comptroller-General of the United States to apply the 8-hr. Law of 1912 to the purchase of ready mixed concrete, but an interpretation was secured from the Procurement Division stating that the act did not apply to this industry.

The industry has coöperated with the Public Contracts Division of the U. S. Labor Department in the determination of prevailing minimum wages under the Walsh-Healey Act. Mr. Ahearn referred to the complaint filed against the Old Colony Crushed Stone Co., Boston.

Products and Markets

A very interesting and profitable afternoon of the National Sand and Gravel Association's convention was spent in informal round-table discussions on markets and products in the modern low cost highway construction program. The idea was original with V. P. Ahearn, executive secretary of the association, and the success was evident. Two experts in this type of highway construction were chosen to take the stand and start the discussion. The rest of the session consisted of questions and answers—and it really was interesting and helpful.

Bituminous Mixtures

Geo. E. Martin, Barrett Co., promoters of Tarvia type pavements and road surfacing, led the first discussion. First he reviewed the struggle of sand and gravel producers to find a market in the bituminous road field, which was at first difficult because they had hitherto concentrated all their energies on concrete aggregates. He said the producers of bituminous materials had early recognized the necessity of using sand and gravel if their own markets were to expand.

Mr. Martin said that there are types of bituminous surfacing where gravel can be used satisfactorily, without question. Since the user must be satisfied he advised sand and gravel producers to stick to these types in their promotional efforts. But even in those types where sand and gravel is satisfactory the producer is faced with the competition of crushed vs. uncrushed gravel.

Manufacturers' Exhibit, National Sand and Gravel Association Convention, where you can identify: (1) nominating committee (?) in session; (2) M. B. Garber; (3) Garvin Pelsue, Los Angeles; (4) Barney Devine; (5) General Electric Co. exhibit; (6) Herman Schifflin; (7) Capt. Duffy, Louisville, Ky.; (8) C. S. Huntington and Frank Welch; (9) group watching General Electric Co. exhibit

and of side-of-the-road vs. commercial materials.

There are advantages in using processed materials for certain types of surfacing, and Mr. Martin suggested that commercial producers stick to promotion of these types; at least very largely. These types are, briefly, those which *do not* depend on interlocking aggregates for stability. The re-tread type is of this class. The "closed" type is the kind where graded sand and gravel best fits into the picture. In this type stability of the surface depends on a dense mixture, achieved by the use of fine aggregate and filler material, in contrast with the "open" type which depends on interlocking coarse aggregate for surface stability. The closed type pavement surface is usually made of a plant mixture, but portable mixers are also used. In several places concrete truck mixers have been successfully employed to make and deliver cold, cut-back bituminous mixtures.

B. E. NEAL, Neal Gravel Co., raised the question of the use of gravel in open-type surfacing. Mr. Martin, replying, said that there are a few localities and a few gravels where open-type surfacing could be used satisfactorily. Mr. Neal thought that it could be demonstrated that there was less breakage with rounded gravel than with angular fragments. Mr. Martin added that there is a growing tendency to use closed surface mixtures even where the base is constructed with the open-type mix.

C. F. MULLEN, Florida Gravel Co., told of a re-tread type road constructed in the South using only 1-in. to ½-in. gravel, which has given very satisfactory service for five years. He said it was subjected to a lot of motor traffic and also to considerable steel-tired mule-drawn traffic. Mr. Martin countered with the suggestion that it was the unusual steel-tired traffic which accounted for the exceptional service record.

M. G. KERR, American Aggregates Corp., expressed the opinion that it was the development of asphalt type road surfaces which had caused the sand and gravel industry to lose much business and some prestige too, because it was too easy for the kind of material used to be produced by road contractors in side-of-the-road plants.

E. H. NORBLOM, Landers Norblom Christianson Co., asked if crushed gravel was not the proper material for carpet coats on bituminous construction. Mr. Martin replied that the tendency was in that direction. It then developed that state highway specifications in West Virginia and North Carolina had recently been changed to admit the use of crushed gravel for wearing carpets.

Mr. Martin said he favored leaving the sand in such carpet materials—that the fines gave the surface additional stability; probably 15 to 20 percent fines. Supporting this opinion E. J. NUNAN, Buffalo Slag Co. (also sand and gravel producer) told of a gravel re-tread type of road using 1-in. to ½-in. with not over 45 percent crushed material, sealed with ¼-in. to dust, which is giving excellent service. J. RUTLEDGE HILL, Gifford-Hill & Co., said that in Texas and Louisiana both crushed and uncrushed material was used indiscriminately. He also said there was no stripping problem with either aggregate. Mr. Martin said the stripping problem was not so serious as it might look; in any event it was more serious a problem with open-type construction than with closed type, for with the closed type, by keeping the moisture out, there would be no stripping.

Stabilized Road Surfacing

F. V. REAGEL, Missouri State Highway Department, led the round-table discussion on stabilized road surfacing. This process of road surfacing, he said, originated in the search for a cheap hard surface farm-to-market road. It not only represents the largest mileage now under improvement but a very large potential field. Mr. Reagel then explained the simple principles of soil mechanics, in which the amount of moisture retained in the soil is the criterion of its stability. By means of a simple diagram he illustrated how the load in pounds a given soil will carry varies inversely with increasing moisture content, until with an excess of moisture the soil becomes first plastic and finally a slurry (mud).

There are two general methods of making stabilized road surfaces: (1) starting with a coarse aggregate base to which is added a binder (soil or clay) —with the correct amount of moisture surface tension is increased, which produces the binding effect; calcium and sodium chlorides by helping the binder retain moisture are helpful; (2) the soil phase method in which a binder is incorporated in the soil for keeping down moisture; such binders are portland cement and bituminous materials; in this case the aggregates used are not important, according to Mr. Reagel, although a graded material would undoubtedly make a better bearing base.

Stabilization is increasing, according to Mr. Reagel, but practice has not yet achieved its goal of a really low cost road; attention will be directed here for a long time. Because low cost can be achieved in many instances only through the use of local, low cost aggregates, he urged commercial producers to give more serious attention to temporary operation of local plants.

Asked by B. E. Neal, Neal Gravel Co., if the tendency was toward the use of bituminous binders for road stabilization, Mr. Reagel said he thought, in the middle west at least, the tendency was toward clay-gravel and clay-stone surfaces. He said much research was needed on clays to obtain the most desirable type of binder. He thought calcium chloride might be more than a retainer of moisture, it might have some physical-chemical effect on the clay. He said stabilized soil bases, constructed as outlined, were covered with some kind of a water-repellant surface.

M. G. Kerr, American Aggregates Corp., raised the question of cost; he said recent stabilized road construction in Michigan had cost upward of $20,000 a mile; at that cost, why not concrete? Mr. Reagel said the average cost of stabilized road surfacing in Missouri was $7,000 per mile. R. A. Giddings, Calcium Chloride Association, thought sand and gravel producers should take a more active interest in promotion of stabilized mixes, for there was danger that research would develop stabilized soils which would need no aggregates of any kind. Mr. Reagel concluded by saying that the market for stabilized soil bases included not merely highways, but a large acreage of airports.

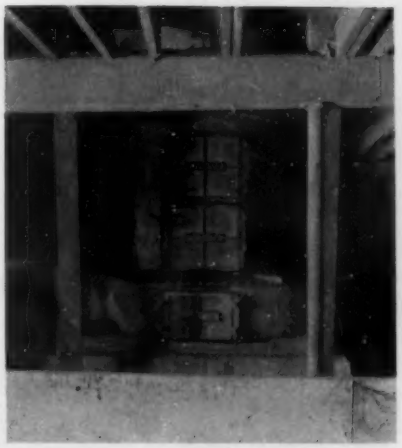
Round Table Discussion on Labor Relations

A ROUND TABLE DISCUSSION of labor problems concerning sand and gravel and ready mixed concrete producers took over the entire final afternoon session on Friday, January 27. Executive Secretary V. P. Ahearn initiated the discussion by asking various members questions about labor problems, involving extent of unionization in different areas, whether AFL or with CIO, troubles with boycotts, etc.

As it was in effect an executive session and no reports were made of the proceedings, several general comments may be made regarding the opinions expressed. Apparently less trouble has been experienced in recent months from the boycott, particularly as it affects the ready mixed concrete operator, largely due to the Lapp decision. Producers are learning how to maintain better relations with their employes and with labor leaders by frank, open dealings on all questions. Better educated and higher types of labor leaders are coming to the front, making negotiations much easier. Recognition must be made that labor union activities constitute a business and that the labor leader must demonstrate to the rank and file that his services are bringing results. The relative value of individual company agreements with unions as compared with regional industry agreements was discussed.

Firing Shaft Lime Kilns With Unit Coal Mills

By BROR NORDBERG



Mill for pulverizing lime preparatory to the production of mason's hydrate

Direct firing of shaft lime kilns with pulverized coal has been tried a number of times by various lime producers without success. The main difficulties have been in attempting to get uniform burning conditions—the proper flame length and draft to give maximum heat penetration into the center of the kiln and high enough in the kiln to burn the lime thoroughly and evenly. Some have had a lot of trouble because of ash contamination of the lime, and apparently the kiln diameters, in certain cases, have made direct firing impracticable. Too great a kiln diameter for a particular coal unit pulverizer with certain draft conditions has been known to cause very premature failure of kiln linings.

In spite of all factors responsible for failures by others, the Moores Lime Co., Springfield, Ohio, has been firing successfully for the past three years four shaft kilns with unit coal pulverizers and induced draft. No two kilns are alike, being cylindrical and oval in shape, and the No. 1 spall kiln burns spalls down to 1 in. in size. This kiln has a "cork-screw" lining to keep the small stone from packing. All were originally designed for natural gas firing. With direct firing by coal the fuel ratio (lime to coal) has been increased by more than 25 percent over natural gas and average fuel ratios of from 5½ to 6 tons of lime to a ton of coal are claimed.

The coal pulverizers are very small hammer mills, one being used to fire each side of each kiln. They are arranged in two banks of four, each bank serving one side of the four kilns. Each mill has an individual coal hopper, all eight of them being located in a line parallel to the coal trackage and main storage area outside the plant proper. The hoppers are filled by hand-shovels and feed to the mills is through revolving plate feeders.

The coal mills were manufactured by The Sims Co., Erie, Penn., and are driven at 3450 r.p.m. by individual 3-hp. enclosed motors (Armor Electric Manufacturing Co., Erie, Penn.) These mills are a type commonly used for firing steam boilers. In normal operation, each mill pulverizes 135 lb. of coal per hour to the desired fineness. The hammers are 2 in. square and have a life of 150 tons of coal pulverized before changing hammers. The hammers are of high manganese steel. With new hammers, coal is pulverized to about 85 percent through the 200-mesh sieve with a progressive falling off in efficiency, of course, as the hammers become worn. The raw fuel feed is ¼-in. minus screenings with a heat value of 12,190 B.t.u., 3 percent ash and very little sulphur. Some experimentation is to be done with a mill and separator unit to determine the effect of a controlled and uniform coal fineness on the burning efficiency.

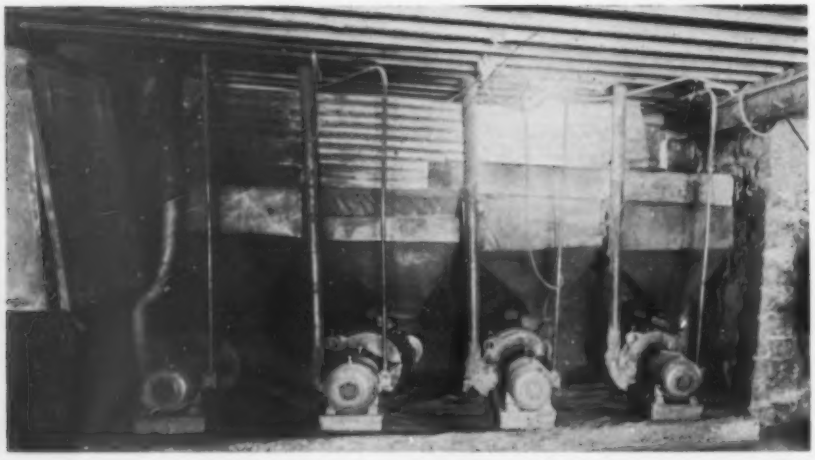
Kilns are charged through slide covers on the tops of the kilns, and draft is induced by the fan shown in the right foreground. Draft is controlled through the use of dampers

Convert Shaft Kilns to Burn Pulverized Coal

In converting the kilns to burn pulverized coal in place of natural gas, fire boxes were added by The Sims Co. engineers with the idea of using them as combustion chambers to catch the ash. However, the kilns did not operate successfully on that arrangement and the fire boxes serve little useful purpose now except to cover the large open arch, which drops out the lime on which ash has been deposited. The feed of coal into No. 1 kiln from each coal mill is split through two 2½-in. diameter burner pipes and the other kilns are fired through a single 3-in. diameter burner pipe from each mill. The burner pipes are stopped short about 2 ft. from the fire arches in the ovens. The burning zone is about 6 ft. high above the arch or burner pipe. The arches are not sealed up. They were left open so that the exposed lime surface will catch the coal ash deposited from the end of the burner pipes.

The kilns are 55 ft. in height with a shell diameter of 12 ft., and now have a maximum capacity of 25 to 30 tons of lime per day. They are charged in the conventional manner by pulling side-dump cars up an incline over 30-in. gauge track by a 2-drum hoist.

To make the induced draft effective to the greatest degree, the kiln tops have been sealed with 5- x 7-ft. rectangular slide tops which are opened only when charging the kilns. Induced draft is provided for each kiln by a Clarage No. 19 fan direct-connected to a 10-hp. Lima motor. Gases are pulled through 20-in. diameter piping



Four unit coal pulverizers, one for each of four kilns. Four similar units pulverize coal for the other side of the kilns. Coal from the hoppers is fed to the mills through revolving plate feeders

by the fan and discharged into the atmosphere at 250 deg. to 500 deg. F.

Each kiln has a damper to control the draft, and its operation is controlled from an instrument room on the main firing floor. In this room are draft gauges and ammeters, which record the flow of electrical current through the motors driving the fans and give a check on burning conditions in the kilns. The kilns are operated on a draft of about ½ in. measured in the cooler.

Drawoffs of lime are made every three hours and the small percentage of lime contaminated by coal ash is separated out on the drawoff floor. The figures given on capacity and fuel efficiency are average and not for any particular operating interval. The kilns are variable in their performance but the net average result has been a considerable saving in fuel. The spall kiln, which gave the poorest performance when fired with natural gas, operates with the greatest efficiency on pulverized coal. To increase efficiency further it is planned in the near future to pipe CO_2 gas from the tops of the kilns and utilize it in place of air to lengthen the flame in the kilns.

The lime produced is a high magnesia product. The crushed lime is first pulverized in a Raymond mill which operates with a cyclone and is hydrated in a Kreitzer continuous-flow hydrator. John Moores is general superintendent of the plant.

Lime in 1938

ACCORDING TO preliminary figures furnished the Bureau of Mines by producers, shipments of lime (sales) in 1938 decreased approximately 17 percent, compared with 1937. Total sales amounted to 3,424,000 short tons valued at $24,153,000. Demand for lime during the first 8 or 9 months of the year was comparatively poor, but increased activity in the chemical, metallurgical and building industries in the latter part of the year created a more active market. Indiana and Tennessee were the only states for which any noteworthy increase is indicated.

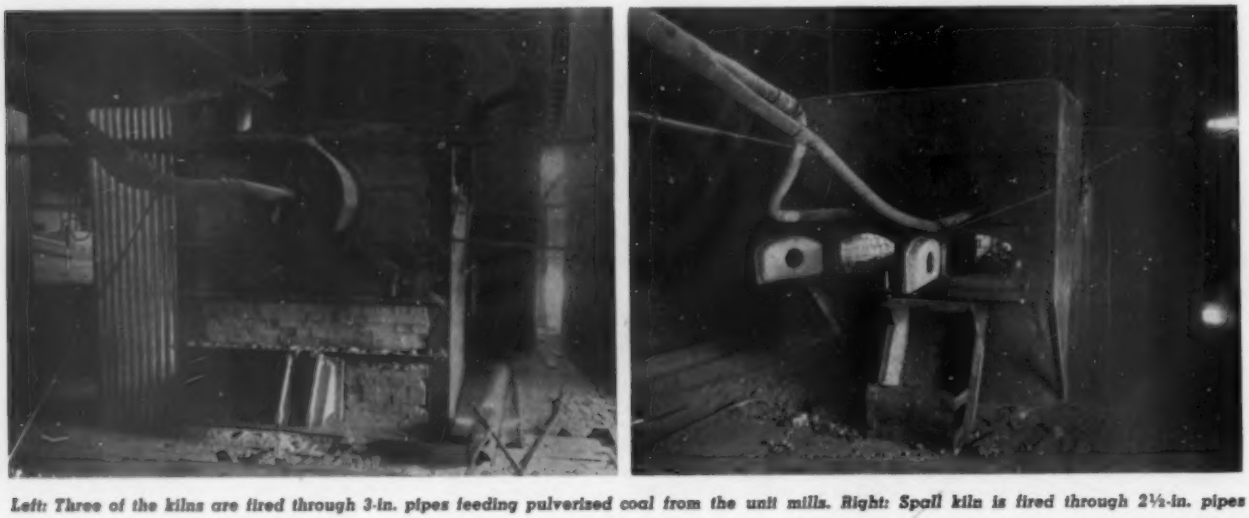
Lime sold for construction, estimated at 887,000 tons valued at $7,385,000, decreased about 7 percent in quantity and 10 percent in value. The decline in sales for building purposes was less than for other major uses. Sales for agricultural purposes amounted to 356,000 tons valued at $2,397,000, a decrease of 12 percent in quantity and 13 percent in value. So-called "chemical" lime (exclusive of dead-burned dolomite) amounted to 1,824,000 tons valued at $11,390,000. This represents a decrease of 15 percent in quantity and 18 percent in value from 1937. Over one-half of all the lime sold was included in this classification. Shipments of dead-burned dolomite suffered the greatest decline in 1938 compared with 1937, 42 percent in quantity and 43 percent in value. Based on reports received the quantity estimated is 357,000 and the value $2,981,000. Ohio with an output of 242,000 tons valued at $2,098,000 was the largest producer of this material.

Prices throughout the country were about the same or slightly lower than in 1937. The average value reported for 1938 was $7.05 per ton compared with $7.30 in 1937.

Hydrated lime included in the total amounted to 1,092,000 tons valued at $8,640,000, a decrease of 16 percent in both quantity and value. About one-half of the hydrated lime is used by the building trades, one-third for chemicals and the remainder for agriculture.

Erratum

IN THE FEBRUARY, 1939, issue of ROCK PRODUCTS, page 42, reference was made to the application of a cut-back asphalt to slag aggregate which had been pre-treated with Sealdrok waterproofing compound. The material used was 85-100° penetration asphalt cement.



Left: Three of the kilns are fired through 3-in. pipes feeding pulverized coal from the unit mills. Right: Spall kiln is fired through 2½-in. pipes

Exhibits Reveal Progress in Equipment Development

Through the exhibits held at the Netherland Plaza Hotel, Cincinnati, Ohio, in connection with the conventions of the sand and gravel, ready-mixed concrete, and crushed stone producers, manufacturers provided an unusual opportunity to view the latest developments in equipment and materials.

Brief descriptions of the exhibits and those in attendance at the meetings and exhibits who were registered are given below for those who were not fortunate enough to have attended the conventions of the National Sand and Gravel Association, National Ready-Mixed Concrete Association, National Crushed Stone Association, and National Lime Putty Association:

Allis-Chalmers Manufacturing Co., Milwaukee, Wis., had a number of interesting models on display in its booth, including a low-head vibrating screen, a single-deck vibrating screen, gear reduction unit, motors, and a complete crushing and screening plant model. Representatives included: M. E. Bechtold, A. Goldberg, J. C. Collier, Irving K. Cox, J. H. Gerber, R. L. Halsted, Wm. C. Johnson, E. F. Kochman, C. S. Lincoln, Henry W. Schaub, Herman Schiffin, C. E. Van Duser, T. S. Wilmeth, F. A. Young.

American Bitumuls Co., Baltimore, Md., showed samples of a stabilizing material for road construction as a means of utilizing quarry fines. Representatives included: Floyd L. Reed, and L. D. Townsend.

American Manganese Steel Division, American Brake Shoe & Foundry Co., Chicago Heights, Ill., exhibited models of 10-in. and 12-in. pumps, welding rod, dipper teeth, chain, and dipper. Representatives included: G. E. Blackemore, W. M. Black, Bradley S. Carr, W. A. Henderson, W. J. Mullally, Perry Nagle, D. B. Rice, Leo E. Stagentin, and J. B. Berrbell, Jr.

Atlas Powder Co., Wilmington, Dela., used moving pictures to illustrate safe blasting practices with its products. Representatives included: J. H. Buchanan, W. W. Caldwell, Chas. H. Duesing, Geo. T. Erickson, Paul T. Evans, John F. Flippo, J. A. Gilruth, John M. Jeffries, J. A. Moir, and Ted Roberts.

Barber Greene Co., Aurora, Ill., displayed photos illustrating various types of loaders and conveyors, and also exhibited conveyor belt idlers. Representatives included: Paul S. Frederick and H. W. Newton.

Blaw-Knox Co., Pittsburgh, Penn., had illuminated photographs in color of various applications of mixers, loading plants, and concrete batching equipment. Representatives included: Robt. T. Harris, R. P. McKenrick, Arthur A. Levison.

Brooks Equipment & Manufacturing Co., Knoxville, Tenn., had a number of large photographs showing truck loader equipment in action at quarries. Representatives included: Wm. A. Buchanan, and Thos. Osborne.

Bucyrus-Erie Co., Milwaukee, Wis., showed moving pictures of drills, dredges, shovels, etc., in action, and also had a display of photographs. A model of the 29-T drill was in operation during the crushed stone convention. Representatives included: E. J. Wilkie, L. B. Birckhead, P. H. Birckhead, Chas. W. Buehler, Geo. A. Carlson, C. B. Foster, F. Leslie Jones, Frank B. Smith, M. J. Woodhull, and F. O. Wyse.

Chain Belt Co., Milwaukee, Wis., had a transit mixer painted white on display with a glass window in the drum and colored rubber balls to show the action on the aggregate and cement. Representatives included: Charles F. Ball, Geo. A. Cooper, B. F. Devine, A. J. Frank, D. A. Kalton, E. F. Leffingwell, Wood Sanford, G. K. Viall, and George P. Williams.

Cross Engineering Co., Carbondale, Penn., had a display of samples of perforated screen plate. Representatives included: Thos. E. Brannen, Wm. F. Colclough, R. L. Emswiler, J. H. Fulkerson, H. S. Woodward, J. W. Herr, and D. W. Moore.

Deister Machine Co., Fort Wayne, Ind., demonstrated an 8- x 12-ft. Deister Plato double-deck vibrating screen. Representatives included: Irwin F. Deister, B. J. Roberts, and A. F. Tenney.

E. I. du Pont de Nemours & Co., Wilmington, Dela., had a large, illuminated map in the background of its display, a printed list of its products, action photographs of blasts, and a seismograph. Representatives included: F. D. Bickel, Edward F. Carley, R. C. Crumbaugh, Karl P. Doerr, J. W. Koster, J. M. Rawlins, S. R. Russell, J. T. Turnbull, Rudolph M. Valz, and Edwin T. Wolf.

Eagle Iron Works, Des Moines, Iowa, showed a model of a screw washer, and a swintek screen nozzle ladder. Illuminated photographs in the background illustrated sand tanks, spiral screw washers, swintek screw nozzle ladders, paddle type log washer, and sand drags. Representatives included: Theodore Aulmann, C. B. Laird, and Harold White.

Easton Car & Construction Co., Easton, Penn., had a large panel display with a drawing of a Phoenix semi-trailer of the latest type, and the names of some of the large users of this equipment in the crushed stone industry. There were also action photographs of the equipment. Representatives included: Louis J. DiMicell, Cott Farrell, and G. D. Fraunfelder.

Frog, Switch & Manufacturing Co., Carlisle, Penn., displayed photographs of dredge pump and shovel castings made by the company, and samples were shown of manganese castings. Representatives included: W. L. Jackson, H. A. Johann, S. B. Maximon, and J. S. Morrison.

General Electric Co., Schenectady, N. Y., had perhaps the most unique exhibit of the show. The display was planned for exhibition at the San Francisco and New York worlds fairs, and consists of large coils employing the principle of magnetic induction and other electrical forces to hold suspended in mid-air an aluminum disc or dish. Representatives included: A. W. Burns, L. W. Shugg, and Aubrey Smith.

Gruendler Crusher & Pulverizer Co., St. Louis, Mo., distributed literature describing its crusher equipment. Representatives included: Wm. P. Gruendler, C. G. Milburn, T. A. Oberhellman, and Ted Poese.

Hardinge Co., Inc., York, Penn., had a display of large photographs showing a conical scrubber, constant weight feeder, counter current classifier, thickener, rod mill, mill with superfine classifier, and two types of dryers. Representatives included: C. W. Ankeny, F. E. Finch, and G. F. Metz.

Hendrick Mfg. Co., Carbondale, Penn., had an illuminated display of photographs showing perforated screen plates, open steel flooring, and grilles. Samples of various types of perforated screen plate were also shown. Representatives included: D. M. Blackburn, A. E. Quere, B. G. Shotton, and W. B. Stoddard.

Hercules Powder Co., Wilmington, Dela., had an interesting dioramic display, illuminated in color, to show the different applications of blasting in quarries. Representatives included: Wm. A. Anderson, A. E. Forster, W. F. Gainty, Jos. I. Horty, Roy Keane, Milo A. Nice, and F. W. Roman.

International Harvester Co., Chicago, Ill., had two panels of photographs illustrating various applications of trucks, with different dumping bodies. Representatives included: W. F. Nixon, Carl Lippert, J. B. Henry, B. M. Kaiser, and Wm. H. Parrish.

Jaeger Machine Co., Columbus, Ohio, had a working model of a truck mixer and photographs of mixers in operation. A glass window on the mixer drum model showed the mixing action. Representatives included: Henry C. Fraas, J. E. Gaylord, L. Gardiner, Mark Gay, Arthur R. Johnson, E. G. Mandt, V. G. Mandt, L. T. Phillips, and Jos. A. Thomas.

Jeffrey Manufacturing Co., Columbus, Ohio, showed a size 20, type B3 swing hammer pulverizer with a Jeffrey-Traylor vibrating feeder. Four types of conveyor belt idlers also were shown. Representatives included: Ralph L. Appleton, L. E. Brill, C. O. McFadden, L. B. Martin, and Roy D. Prushing.

Kelbar Powder Co., Wilmington, Dela., was represented by J. Barab, and J. J. Kelleher.

Kennedy Van Saun Mfg. & Engr. Co., New York, N. Y., had a display of photographs of crushers and other equipment arranged on panels which could be turned like leaves in a book. Representatives included: F. E. Hall, Jos. S. Hicks, and F. C. Reedy.

A. Leschen & Sons Rope Co., St. Louis, Mo., exhibited samples of wire rope and distributed literature about its products. Wm. Berninger represented the company.

Lima Locomotive Works, Inc., Lima, Ohio, had a display of large photographs illustrating various types of shovels, draglines, etc., in action. Representatives included: J. E. Mereness, M. K. Tate, and Roy Wills.

Link-Belt Co., Chicago, Ill., showed large photographs of screens, conveying equipment, batch plants, washing and classifier equipment, and models of screen, conveyor belt idlers, and a gear reduction unit. Representatives included: R. B. Holmes, C. S. Huntington, and Jesse Richards.

Manganese Steel Forge Co., and Audubon Wire Cloth Corp., Philadelphia, Penn., had a large number of manganese forgings on display and samples of wire screening. Representatives included: L. R. Cartwright, L. W. Jones, Jr., John G. Logan, and W. H. Potter.

Marion Steam Shovel Co., Marion, Ohio, displayed illuminated photographs of various applications of shovel equipment. Representatives included: John P. Courtright, Harvey T. Gracely, L. C. Mosley, John L. Steward, Louis G. Uhl, and Walter N. Westland.

National Powder Co., Eldred, Penn., was represented by A. J. Goodwin, and Donald G. Stitt.

National Supply Co., Springfield, Ohio, had six large photographs of Diesel engine installations mounted on panels and illuminated with neon lights. R. H. Huffman represented the company.

Nordberg Mfg. Co., Milwaukee, Wis., had on display models of the Wood-auto-vortex classifiers of the cone type and bowl type, Symons vibrating screen, Symons crusher, a new type impact crusher, and short head

(Continued on page 87)

A Tour Through the Exhibition Hall

1. Allis-Chalmers Mfg. Co.
2. Jeffrey Mfg. Co.
3. Gruendler Crusher & Pulverizer Co.
4. Frog Switch & Mfg. Co.
5. Easton Car & Construction Co.
6. Hercules Powder Co.
7. Jaeger Machine Co.
8. John A. Roebling's Sons Co.
9. American Bitumuls Co., left and National Supply Co., right
10. The Marion Steam Shovel Co.
11. Northern Blower Co.
12. Kelbar Powder Co.
13. Nordberg Mfg. Co.
14. Deister Machine Co.
15. Ransome Concrete Machinery Co., left and Smith Engineering Works, right
16. Pettibone-Mulliken Corp.
17. Cross Engineering Co.
18. Brooks Equipment & Mfg. Co.
19. Barber Greene Co.
20. Sauerman Bros., Inc., left and Transit Mixers, Inc., right

21. Hendrick Mfg. Co.
22. Hardinge Co., left and Screen Equipment Co., right
23. Eagle Iron Works
24. American Manganese Steel Division of the American Brake Shoe & Foundry Co.
25. Blaw-Knox Co.
26. Robins Conveying Belt Co., left and Taylor-Wharton Iron & Steel Co., right
27. Traylor Engineering & Mfg. Co.
28. Chain Belt Co.
29. The W. S. Tyler Co.
30. E. I. du Pont de Nemours & Co.
31. The Thew Shovel Co.
32. General Electric Co.
33. International Harvester Co., Inc., left and Simplicity Engineering Co., right
34. Bucyrus-Erie Co., foreground and Atlas Powder Co., background
35. A Leschen & Sons Rope Co.
36. The T. L. Smith Co.
37. Kennedy-Van Saun Mfg. & Eng. Corp.
38. Link-Belt Co.
39. National Powder Co.
40. Manganese Steel Forge Co. and Audubon Wire Cloth Corp., left and Lima Locomotive Works, Inc., right

Crushed Stone Producers Look to New Markets for Increased Production

President T. I. Weston of the National Crushed Stone Association was very pleasantly surprised by the unusually excellent attendance at the annual convention meetings in Cincinnati, Ohio, January 30 to February 1. There was no question as to the serious character of the problems which confronted the industry, and the proceedings reflected an earnest desire to obtain information which would serve to guide producers in meeting new situations arising from recently enacted federal legislation affecting both labor and markets, and also production problems.

Election of Officers

President T. I. Weston was reëlected, but some changes were made among the regional vice-presidents. The regional vice-presidents are as follows: (eastern), W. M. Andrews, New Castle, Penn.; (central), J. A. Rigg, Ft. Spring, W. Va.; (southeastern), W. T. Ragland, Raleigh, N. C.; (northern), R. N. Wallace, Bay Port, Mich.; (northwestern), P. W. Yett, Portland, Ore.; (western), A. J. Wilson, Watsonville, Calif.; (southwestern), R. S. Wilson, Little Rock, Ark.; (midwestern), N. E. Kelb, Indianapolis, Ind.

The board of directors comprise the following: T. I. Weston, chairman, Columbia, S. C.; W. M. Andrews, New Castle, Penn.; C. C. Beam, Melvin, Ohio; W. P. Beinhorn, Minneapolis, Minn.; H. E. Billman, St. Louis, Mo.; L. J. Boxley, Roanoke, Va.; J. R. Boyd, Washington, D. C.; H. R. Brownson, Malden, Mass.; J. R. Callanan, South Bethlehem, N. Y.; A. R. Couchman, New York, N. Y.; C. M. Doolittle, Hamilton, Canada; F. O. Earnshaw, Youngstown, Ohio; Arthur F. Eggleston, Meriden, Conn.; A. T. Goldbeck, Washington, D. C.; O. M. Graves, Easton, Penn.; A. Acton Hall, Piqua, Ohio; George Hammerschmidt, Elmhurst, Ill.; J. L. Heimlich, Le Roy, N. Y.; W. E. Hilliard, New Haven, Conn.; R. P. Immel, Knoxville, Tenn.; N. E. Kelb, Indianapolis, Ind.; E. J. Krause, St. Louis, Mo.; Paul M. Nauman, Dubuque, Iowa; W. T. Ragland, Raleigh, N. C.; H. E. Rainer, Buffalo, N. Y.; Russell Rarey, Columbus, Ohio; John Rice, Easton, Penn.; J. A. Rigg, Ft. Spring, W. Va.; H. E. Rodes, Nashville, Tenn.; Dan Sanborn, Kankakee, Ill.; James Savage, Buffalo, N. Y.; F. W. Schmidt, Jr., Morristown, N. J.; W. C. Sparks, Princeton, Ky.; O. M. Stull, Rocky Point, Va.; Stirling Tomkins, New York, N. Y.; Harold Williams, Boston, Mass.; R. N. Wallace, Bay Port, Mich.; A. J. Wilson, Watsonville, Calif.; R. S. Wilson, Little Rock, Ark.; W. F. Wise, Dallas, Texas; A. L. Worthen, New Haven, Conn.; Porter W. Yett, Portland, Ore.; and Manufacturers' Division representatives, Roy Wills, Lima, Ohio; H. A. Johann, St. Louis, Mo.; and L. W. Shugg, Schenectady, N. Y.

Roy Wills, new chairman, Manufacturers' Division, N.C.S.A.

Manufacturers' Division

Roy Wills, Lima Locomotive Works, Lima, Ohio, is the new chairman of the Manufacturers' Division, succeeding H. A. Johann, Frog, Switch & Manufacturing Co., St. Louis, Mo. The following new associate members were announced: Smith Engineering Works, Milwaukee, Wis.; Pettibone-Mulliken Co., Chicago, Ill.; King Powder Co., Inc., Cincinnati, Ohio; Stephens-Adamson Co., Aurora, Ill.; and Ohio Locomotive Crane Co., Bucyrus, Ohio.

It was voted to hold the next annual meeting in St. Louis, Mo., at the Jefferson Hotel. Further information regarding dates will be published in a later issue.

T. I. Weston, reelected president, N.C.S.A.

Reports of Regional Vice-Presidents on Business Conditions

President Weston called on the regional vice-presidents for reports on business conditions in the various territories.

N. E. Kelb, Indianapolis, Ind., northern region, reported that the situation had not improved last year over 1937. While certain plants suffered no loss, it was estimated that for the region there was a shrinkage of from 10 to 30 percent. Production was allocated as follows: 40 to 50 percent went to highway construction; 10 to 20 percent in railroad ballast; and 5 to 10 percent in agricultural limestone. Illinois had the largest market for agstone, totaling 1,500,000 tons. It is expected that tonnage in 1939 will show some increase at about the same price level. In spots WPA plants have seriously interfered with established production, but if WPA funds were to be expended in part by the PWA, as proposed in Congress, it would help to divert some of the business to the established plants.

J. A. Rigg, Ft. Spring, W. Va., central region, composed of the states of Virginia, West Virginia, Kentucky, Ohio, and a part of western Pennsylvania and a small part of Indiana, reported a decline in business for 1938 over 1937 of possibly 10 percent with no change in prices. Average volume of production was about 50 percent of plant capacity. Highway construction took 52 percent, railroad ballast 10 percent, building construction 8 percent, chemical and metallurgical uses 17 percent, agricultural 10 percent, and miscellaneous 3 percent. The ever-increasing importance of federal funds as a factor in highway construction and for agricultural stone and the dependence of local authorities on these funds was emphasized. A slight

increase in volume is anticipated in this region in 1939.

W. F. WISE gave the report for the southwestern region, pinch hitting for Mr. Eikel. He gave a personal estimate that production was 85 percent of 1937, prices about 10 percent downward; and operations about 25 percent of plant capacity. Highway construction accounted for 65 percent of the business, ballast 25 percent, and miscellaneous, 10 percent. He said the government seems to be taking most of the business in the southwest. Some improvement in business is expected in 1939. President Weston read a telegram from A. J. Wilson on the situation in northern California which stated that prices were off 5 percent, demand was 40 percent of capacity, highway construction took 60 percent, railroad ballast 25 percent, building construction 10 percent, and other uses 5 percent. He reported business should increase 10 percent in 1939.

A. L. WORTHEN, New Haven, Conn., gave a verbal report for the eastern region, taking the place of Mr. Brownson. He said that while tonnage was lower in 1938 than in 1937, considerable tonnage was obtained from the aftermath of business caused by the hurricane. Mr. Worthen said that considerable success had been achieved in the standardization of stone specifications in various eastern states largely through the efforts of Mr. Bratt, testing engineer for the Massachusetts State Highway Commission. Connecticut, Massachusetts and Rhode Island, and probably Maine, New Hampshire and Vermont have agreed to uniform specifications. An effort is being made to include New York, at least as to part of the standards.

ROBERT B. SHEPARD, Raleigh, N. C., reported for Mr. Ragland, southern region. Mr. Ragland stated in his letter that the volume as compared with 1937 varied from a reduction of 10 percent in some sections to a gain of 20 percent in others. Production of the southeast as a whole in 1938 was somewhat above the 1937 tonnage and amounted to about 60 percent of plant capacity. No increase in prices was reported. Production was distributed as follows: highways 50 percent, railroad ballast 25 percent, building construction 15 percent, and agricultural limestone 10 percent.

Exemption Under the Labor Act

OTHO M. GRAVES, president, General Crushed Stone Co., Easton, Penn., presented the report of the executive committee, N.C.S.A., on the application for seasonal exemption under the Fair Labor Standards Act of 1938. This report pointed out that in the years covered by the application, 1935, 1936, and 1937, the approximate tonnage produced was 82,000,000 tons, 130,000,000 tons, and 131,000,000 tons, respectively, and the value of the product for those respective years was $72,000,000, $118,000,000, and $122,000,000. About $200,000,000 is invested in plant, equipment, and land.

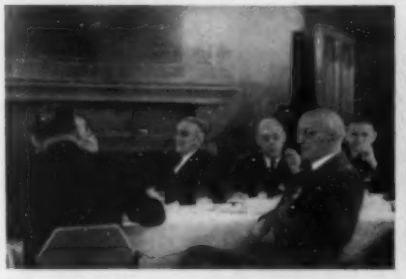
Mr. Graves called attention to the fact that crushed stone is generally produced only from about April 1 to December 1, and that during the remainder of the year plants are substantially idle. Conditions within the industry essentially met the test under both sections (a) and (b) of section 526.3 covering regulations administering section 7 (b) of the Act. These sections of the regulations provide for exemption of an industry which engages in the processing of materials during annually recurring seasonal periods and which ceases production during the remainder of the year.

While "climate" does not necessarily prevent production during the remainder of the year, the report points out that difficult, hazardous operation, additional costs, and lack of a market in this period prevent operation of crushed stone plants. The two largest markets, highway construction and railroad ballasting, are not carried on during the winter months. Tables appended to the report, showing man-hours and plant-hours worked by the industry were classified in three geographical groups to show the relatively small amount of production in the winter months. The differences would be even more marked if proper consideration would be given to the fact that the industry has been giving men so-called "made work", such as stripping, during the winter to enable employes to finance themselves through 12 months of the year. A few plants operate approximately full capacity throughout the winter period, furnishing fluxing stone or stone for other metallurgical purposes, but they are an exception and help to distort the true picture of conditions in the industry as a whole. Plants located in Group 3, largely located in the South and along the Pacific Coast, do not have so long a period of winter idleness, indicating that the need for exemption is less urgent in this group as compared with Groups 1 and 2 in which a major portion of the production occurs. Mr. Graves, in summarizing the report, said that the industry is of the opinion that the evidence and data presented would warrant the Administrator in determining that a prima facie case for granting of exemption has been shown, but should he hold otherwise, it is requested that the application for exemption be not denied and a hearing be held on the application in accord with Section 525.4 of the regulations.

N. Y. Crushed Stone Association Elects Officers

NEW YORK State Crushed Stone Association held its annual meeting at the Statler Hotel, Buffalo, on January 10. Thirty-nine members and guests were present. Officers elected for 1939 include: H. E. Coleman, president; John Rice, Jr., vice-president; H. E. Battin, Jr., treasurer; R. R. Litehiser, secretary and engineering director. Members board of directors include: H. N. Clark, O. M. Graves, H. E. Rainer, Stirling Tomkins.

The new president, H. E. Coleman of the Le Roy Lime & Crushed Stone Corp., Le Roy, N. Y., served as secretary-treasurer during 1937 and as treasurer during 1938. He succeeds J. R. Callanan of the Callanan Road Improvement Co., South Bethlehem, N. Y. H. E. Rainer of the Federal Crushed Stone Corp., Buffalo, N. Y., succeeds Mr. James Savage on the board of directors.



Left to Right: Sam Russell, center, an interested participant in Manufacturers' Division meeting, National Crushed Stone Association; Mike Eiben listens; retiring chairman, H. A. Johann, speaking, incoming chairman, Roy Wills, sits beside him.

Some Candid "Shots" of Crushed-Stone Operators

National Crushed Stone Association Convention High Lights: (1) J. L. Heimlich; (2) Russell Rarey; (3) Norman Kelb and E. J. Krause; (4) center, A. G. Seitz; (5) A. T. Goldbeck; (6) A. L. Worthen; (7) W. J. Stoffel; (8) H. E. Rainer; (9) Chas. M. Upham, director of American Road Builders' Association; (10) H. J. Russell; (11) W. C. Sparks, A. W. McThenia and R. P. Immel; (12) J. R. Boyd, secretary, himself; (13) Miss Beulah M. Davies registers some old friends (no charge); (14) Crushed stone producers signing up

New Markets for Crushed Stone

Several interesting papers were presented at the sessions of the National Crushed Stone Association convention which stressed new markets and products.

Future Highways

MERTON R. KEEFE, chief engineer, State Highway Commission of Indiana, Indianapolis, Ind., in a talk, "Future Highway Development as Related to the Crushed Stone Industry," discussed the reasons for some of the more recent specification changes for aggregates, such as the trend toward more crushed material for surface treatment and its relationship to non-skid properties of roads, etc. He mentioned how the need for more highway safety will result in the widening of existing highways with resulting enlarged markets. In building new roads, it is his opinion that some of the older highways should be torn up and the new pavement be placed on the stable foundations of the old roads.

Highway Funds

H. K. BISHOP, chief, Division of Construction, U. S. Bureau of Public Roads, Washington, D. C., in his paper, "Administration of Highway Funds by the Bureau of Public Roads," discussed the relation of federal aid to other sources of revenue for highway construction, the availability of federal funds for 1940 and 1941, and the extent of the diversion of highway funds.

In 1940, $100,000,000 in federal money will be distributed to the various states and $115,000,000 will be available in 1941, said Mr. Bishop. While the amount of federal aid to be granted should be limited not to exceed 10 percent of the total for any State, Mr. Bishop said that exceptions were being made in some states, notably Nevada which has been granted as much as 86 percent of the total money available for highway construction.

In 1940, $15,000,000 is to be made available for the construction of secondary roads and a like amount in 1941. For grade crossing construction, $20,000,000 is to be granted in 1940 and $30,000,000 in 1941. PWA is to contribute $165,000,000 and other funds are available for the construction of roads in the national forests, national parks and Indian lands. In discussing the diversion of highway funds for other purposes he mentioned the constitutional amendments enacted by some states forbidding the use of highway funds for other purposes. Total diversion in 1937 alone was $161,415,000.

Use of Screenings In Parks

FREDERICH H. GROSS, assistant engineer, Park Department, New York City, described his search for a cheap base material for use on park roadways, playgrounds, tennis courts, etc., which could be mixed with available equipment and laid with W. P. A. labor. After trying cinder and asphalt combinations, limestone screenings were finally selected as aggregate and cold asphalt emulsion as binder. Most any kind of mixer was used, including truck mixers of the type employed for ready-mixed concrete. Mr. Gross gave special credit to A. T. Goldbeck, engineering director of the National Crushed Stone Association, for his work in developing asphalt stabilized mixes, which were employed in this work. The stabilized bases described by Mr. Gross were in most cases given a wearing and weather-proof coat or surfacing of ground Kentucky rock asphalt.

OTHO M. GRAVES, General Crushed Stone Co., Easton, Penn., pointed out that this use of screenings opened a new market for a former waste material. RUSSELL RAREY, Marble Cliff Quarries Co., Columbus, Ohio, asked for more details regarding the construction of tennis courts, saying that his experience was that it is difficult to keep them free of slight depressions which make puddles after rains. Mr. Gross said that they kept these depressions out by use of a fine sprinkling of Kentucky rock asphalt.

A. T. GOLDBECK, National Crushed Stone Association, warned against drawing a conclusion from this discussion that very thin layers of stabilized base are suitable under all conditions. It depended on the bearing power of the soil how thick the base should be.

Skid Resistance of Road Surfaces

R. A. MOYER, Iowa Engineering Experiment Station, Ames, Iowa, illustrated his talk on skid resistance with a number of slides showing various types of road surfaces. Prof. Meyer said that the big problem was to provide a road surface which would have a high coefficient of friction in wet weather or when snow was on the ground.

Tests indicated that surfaces with a sandpaper-like finish provided greater frictional resistance when wet than surfaces on which large-sized aggregate was used to develop a rough-knobby finish. Surfaces with a hard silica sand, quartzite, trap, or similar hard aggregate were more satisfactory than surfaces on which soft limestone or other soft, highly absorptive aggregate was used. Portland cement concrete surfaces rarely become dangerously slippery, when wet, if the surfaces are finished by brooming. It was suggested that applying corundum, carborundum or gannister on the surface of green concrete would be helpful in providing skid-resistance.

For bituminous pavements, the highest resistance to skidding was offered by surfaces covered with sharp, hard sand, or with hard finely crushed rock particles, held in place by the weaker bituminous cement. Excess tar or asphalt in a bituminous mixture is certain to cause a slippery surface.

Agricultural Conservation Program for 1939

W. G. FINN, director of the East Central Region, Agricultural Adjustment Administration, reviewed the progress which had been made in the use of agricultural liming materials and pointed out that prior to 1930 the maximum quantity of limestone used in the seven states of Kentucky, Tennessee, North Carolina, Virginia, West Virginia, Maryland and Delaware was not more than a million tons a year. In 1938, it is estimated that over 2,500,000 tons were used. Mr. Finn said that the liming program also has stimulated the use of phosphate as the two materials are most effective when used together. It was estimated that the seven states mentioned used 230,000 tons of phosphate in 1938.

Turning to the 1939 agricultural conservation program, Mr. Finn said that credit for the application of lime varies from one unit per ton (ground limestone basis) in areas where the average cost is not more than $2 per ton, to a unit for each 600 lb. where the average cost exceeds $5 per ton. The soil-building goal for each farm includes one practice unit for each $1.50 in the payment computed with respect to soil-building practices. It is expected that a considerable increase will be made in the area in which limestone is furnished as a grant of aid under the 1939 program. Bids have been received for material to be furnished farmers in 20 counties of West Virginia and 66 counties in the Northeast region.

W. C. Sparks, Princeton, Ky., raised the question as to whether there had been an increase in performance in

areas where the government had furnished lime and phosphate as grants-in-aid to the farmer and was advised by Mr. Finn that there had been a substantial increase where the material had been furnished as farmers had restricted purchases owing to a lack of money. In answer to a question placed by Garrard Wilson, Lexington, Ky., as to the basis of determining what districts would be given aid, Mr. Finn stated that each case was determined on its merits and that the department would not commence operations in a territory where adequate sources of liming or other materials were available. Answering a question of Philip E. Heim, Youngstown, Ohio, Mr. Finn said that the government permitted the farmer to make a choice as to whether liming materials would be furnished or a cash payment would be received for limestone purchases. A. B. Rodes, Nashville, Tenn., asked about relative credit for materials of fine and coarse mesh, mentioning minus 100-mesh, whereas most producers make minus 4, minus 8 or minus 10-mesh. Mr. Finn replied that the figures referred to of one ton in some areas and 600 lb. in other areas have reference to comparable materials, ground limestone, and that part of it has reference only to the cost of the material. However, 50 lb. of burnt lime are equivalent to one unit in the same area in which 100 lb. of ground limestone are equal to a unit; hydrated lime, 70 lb. per unit.

The Pennsylvania Turnpike As a Market for Aggregates

SAMUEL W. MARSHALL, chief engineer, Pennsylvania Turnpike Commission, Harrisburg, Penn., discussed "The Pennsylvania Turnpike", a toll road now under construction, and its effect on the producers of road building materials. The highway is to be a four lane, divided road extending 160 miles from Harrisburg to Pittsburgh and will follow the roadbed of an old railroad project. Maximum grades are to be three percent and the road is to feature long curves with a minimum radius of 1000 ft. The construction will not involve any cost to the state, but will be paid for by toll charges and when amortized will revert to the state.

Some 1,800,000 tons of aggregates will be needed for the project, produced to specifications similar to the state highway requirements and the construction is to be awarded to individual contractors who purchase from approved quarries. According to Mr. Marshall, the project will provide a steady market into 1940 for aggregates and will open temporary new markets for some producers outside the state. To show the influence of such a project on the market for aggregates, it was pointed out that 7,300,000 tons of coarse aggregates were purchased by the Pennsylvania Highway Department in 1938. Other estimates are for a minimum of 1,500,000 bbl. of portland cement, 600,000 tons of sand and 20,000 tons of reinforcing steel. It is later planned to extend the highway into Philadelphia.

Streamlining Our Highways

CHARLES M. UPHAM, engineer-director, American Road Builders' Association, Washington, D. C., in his paper, "Streamlining Our Highway System," stressed the importance of highway construction on business conditions in general and said that if the highway program is increased several times it would reflect itself in a decided return to prosperous times. The federal government is furnishing over 50 percent of highway funds at the present time and will continue to have an important part, said Mr. Upham, who emphasized the importance in stressing the value of such programs on business in general in order to influence the release of more such money for highway construction. His talk was illustrated by slides showing the advanced types of roads constructed in Germany.

Safety Awards Presented at Both Conventions

SAFETY took a prominent part in the proceedings of both the National Sand and Gravel Association and the National Crushed Stone Association conventions in Cincinnati, Ohio. Both awards are conducted under the auspices of the Bureau of Mines and the respective associations.

At the Friday morning session of the National Sand and Gravel Association, M. P. Greer, safety engineer of the Marquette Cement Manufacturing Co., accepted the Safety Trophy awarded to the Wolf River sand and gravel plant operated by his company near Memphis, Tenn. This plant won first honors among the group of plants that worked 100,000 man-hours or more. It is a wet-pit deposit, and during 1937 operated 122,014 man-hours without a lost-time accident. The superintendent of this plant is R. I. Grogg.

Among plants operating less than 100,000 man-hours, the Dividing Creek plant in Cumberland County, New Jersey, won the highest award. This plant was active for 77,600 man-hours during 1937 without a lost-time accident. Both trophies awarded in the contest sponsored by the Bureau of Mines and the National Sand and Gravel Association are provided by ROCK PRODUCTS.

AWARDS for the 1937 contest winners in the National Crushed Stone Association safety contest were presented by the "Explosives Engineer", (Hercules Powder Co., Wilmington, Dela.). The winner of the plaque was Krause No. 1 quarry of the Columbia Quarry Co., St. Louis, Mo., and the award was accepted by E. A. Heise, safety engineer of the company, who has recently been appointed superintendent of this plant.

Mr. Heise, in accepting the trophy, which incidentally has been won for three consecutive years by this plant, and is now in its permanent possession, reviewed briefly the record. The plant has operated since September 22, 1932, without accidents and has accumulated a record of 1,188,544 man-hours of work since that time. The plant operated 242,477 man-hours without accident in 1938 and up to January 1, 1939, had maintained its perfect record for 6 years, 3 months, and 9 days, said Mr. Heise.

Award Damages in Dust Suit

WABASH PORTLAND CEMENT CO., Osborn, Ohio, has been fighting a suit for damages brought by a farmer who put in a claim for $11,100, charging that the dust from the plant sprinkled his house and farm. The suit was filed originally in the Greene county circuit court in August, 1935, and was transferred to the federal court that same year on motion of the cement company. A verdict was recently brought in awarding damages of $204 for injury to the plaintiff's health, $1500 for damage to the plaintiff's home and grounds, and $986 for damage to the plaintiff's crops. A motion for a new trial is to be made by the cement company, and if this is denied, an appeal will be taken to the U. S. circuit court of appeals at Cincinnati.

Reflecting Pavements

PAVEMENTS which reflect light are being experimented with in Massachusetts, opening up new markets for aggregates. The Illuminating Engineering Society and the Asphalt Institute with the coöperation of Mayor J. Fred Manning of Lynn, Mass., have made studies of pavement surfaces at Lynn to determine the most efficient pavement from the standpoint of light reflection without glare. In one test, a pavement was resurfaced with Chelmsford granite chips ½- to ¾-in. in size embedded in the old pavement with a thin intermediate layer of asphalt.

REPRESENTATIVE D. B. HARDEMAN, San Angelo, Texas, has introduced a bill in the Texas state legislature to provide for construction of a state-owned and operated cement plant. An appropriation of $2,000,000 is asked for and the measure provides for the use of free labor, the product to be sold for use on all public projects.

Research in Crushed Stone

A. T. Goldbeck, engineering director, at one of the meetings of the National Crushed Stone Association, reported the results of investigational work conducted during the past year. Mr. Goldbeck pointed out that while crushed stone does not lend itself to many new uses, it is adaptable to new combinations with other materials and these combinations may develop a sizable market.

He discussed the ever-present necessity for some of the producers to find markets for certain excess quantities of particular sizes and how these products might best be used. According to Mr. Goldbeck, this might involve the determination of the most suitable concrete proportions, the best type of bituminous mixture, the most suitable gradation of aggregate for a particular kind of construction, the building of a test section in coöperation with some state highway department or the demonstration of the particular usefulness of a certain product for a particular purpose, such, for example, as the use of stone sand in sheet asphalt.

Mr. Goldbeck discussed in detail an investigation conducted during the past year at the request of a member company on the design of bituminous mixtures which might be made of certain quarry fines which had thus far been unmarketable. The laboratory's problem was to design economical mixtures using this material without further gradation. Several mixtures were designed for amiesite type and emulsion type bituminous mixes, and were tested on the laboratory circular track.

As a result of the test, the producer decided to advocate one of the liquefier types of mixtures and arrangements were made with the local state highway department to lay short test sections. These sections have been under traffic since October, 1938. The engineering department controlled the mixing at the plant and its suggestions regarding construction procedure were followed, with the result that the mixture has shown itself to be stable and capable of withstanding comparatively heavy traffic.

Mr. Goldbeck discussed investigations made on new combinations involving crushed stone, one of which was the "bituminated filler" process, which is said to be used in Europe with success under difficult climatic conditions. This material consists of finely powdered stone dust which is treated with atomized asphalt (see Rock Products, April, 1938, p. 50).

More recent specifications for stone sand have required a finer gradation than before, and Mr. Goldbeck's investigations have been conducted to determine the effects of comparatively large quantities of dust in the sand on the various properties of mortar. Tests were conducted to determine the amount of dust which might be considered permissible in specifications.

In preparing mortar specimens, dust produced by crushing limestone was used with about 62 percent minus 200-mesh and all passing the 50 mesh. Specimens were made with six different gradations of sand mixed in the proportion of one part portland cement to two parts of stone sand by weight. The consistency was about that of the mortar in a 1:2:3½ concrete having a 2-in. slump.

Results of Tests

Conclusions arrived at by various tests were as follows: (1) to maintain a given consistency in mortars containing dust, varying from 4 to 24 percent, very little increase in the water-cement ratio is needed; (2) the volumetric shrinkage of the fresh mortar is affected very little by increasing the dust content up to 24 percent; (3) increasing the percentages of dust decreases the crushing strength of the mortar; (4) absorption increases with an increasing percentage of dust; (5) durability is affected considerably by high percentages of dust; (6) the shrinkage of the mortar upon drying out in the air is unaffected by the dust content in the sand. These tests are now being continued on concrete.

The field for stone sand in masonry mortars is not to be overlooked since many natural sands are lacking in fines needed to make them sufficiently plastic when made into masonry mortars, said Mr. Goldbeck. According to his tests fine stone sand containing a large quantity of dust when mixed with portland cement produces a high quality masonry mortar or stone sand with plenty of dust produces beneficial effects when mixed with natural sand.

Mr. Goldbeck presented data to show the advantages of stone sand when used in sheet asphalt and fine bituminous concrete mixtures and urged that producers of stone sand investigate the sheet asphalt sand market. According to his test data the stone sand gave very favorable results when tested for stability because of its angularity.

He concluded his report by discussing experiments made on various bituminous surface treatments. The difficulty in the past has always been in obtaining uniformity of results with bituminous surface treatments, said Mr. Goldbeck, even when the work was done under identical specifications, which has resulted in surface treatments suffering somewhat in reputation.

For that reason it was deemed desirable for the Association to attempt to determine the cause of such divergence in results and to make suggestions to overcome the difficulty in a particular southwestern state. The procedure was to lay test sections involving the various possible combinations of quantities of bitumen and aggregates to cover the entire range in gradation and quantity combinations permitted by the specifications.

The test sections were subjected to traffic on the laboratory circular track and the appearance of the various sections exhibited wide differences in their ability to withstand traffic conditions. In some specimens the asphalt had welled up and covered the surface, while in others the aggregate had evidently been placed in excess even though complying with the specifica-

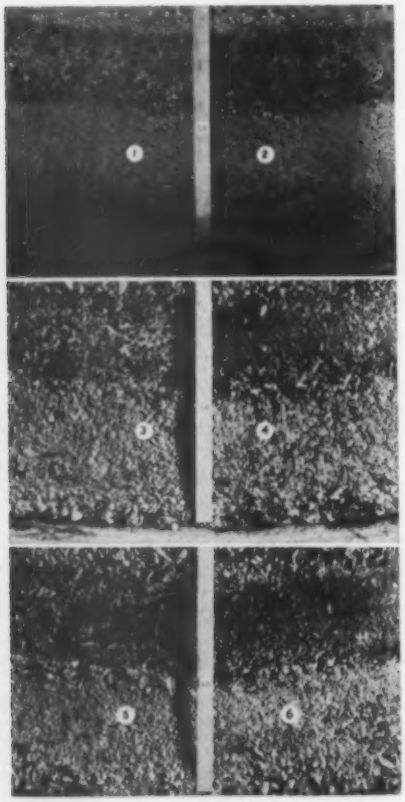
CHARACTERISTICS AND TEST RESULTS OF MORTARS CONTAINING STONE DUST

Identification	A	B	C	D	E	F
Percent—100 mesh	4	8	12	16	20	24
Quantities per unit Volume of mortar						
cement	.205	.204	.203	.203	.203	.202
sand	.472	.470	.468	.468	.468	.464
water	.295	.298	.301	.300	.300	.307
air	.028	.028	.028	.029	.029	.027
Vol. of water loss per unit vol. of fresh mortar	.020	.017	.019	.014	.016	.020
Volumetric shrinkage per unit vol. of fresh mortar	.014	.018	.016	.016	.015	.020
Flow	11.0	10.9	11.0	10.9	11.1	11.1
W/C by Volume	0.68	0.69	0.70	0.70	0.70	0.72
Compressive strength, p.s.i 28-day	9940	9040	9410	9030	9050	8930
*Absorption, per cent	7.6	7.9	9.2	9.4	9.8	10.2
Freezing and thawing 100 cycles, percent loss	1.8	5.1	8.2	8.6	11.3	26.8

*Obtained by oven drying to constant weight after immersion in water for 27 days.

tions. In the latter case the surface had ravelled to some extent.

Illustrations of the various sections served to confirm Mr. Goldbeck's point,



Typical illustrations showing the wide range in appearance of bituminous surface treatments when subjected to test in the circular track experiments, all sections made under the same specifications. Section (6) clearly shows an excess of asphalt while section (2) shows where an excessive amount of fine material has resulted in ravelling

that a great deal of judgment must be used when building bituminous surfaces. He further mentioned that aggregates do not come on the job graded alike even though complying with specifications and that every effort must be made to suit the quantity of asphalt to the type and gradation of the aggregate used.

Association Activities

J. R. Boyd, administrative director, discussed "The Value of Association Activities," touching upon the work that has been accomplished on behalf of the association members in regard to legislative matters, reviewing in some detail the work being conducted by the engineering director and staff in developing new markets and in solving industry problems.

Registration of those attending the National Crushed Stone Association may be found on page 59 of this issue.

Labor Relations and Legislation Create Lively Discussion

"Give Us This Day Our Daily Job"

Whiting Williams, internationally known consultant on labor relations, always provides an address of unusual interest, packed full of human-interest stories to illustrate the points which he wishes to bring home. Mr. Williams regarded the situation of the worker today as much more serious than it was two years ago when he talked to the convention. The government and a large part of the public, he said, do not understand that the worker wants more than a job. Every possessor of a job, whether it be chairman of the board or worker on the section gang, expects three things: first, the dollar; second, a chance at a platform for the support of a minimum of self-respect; and third, the rungs of importance which give him a chance at honor, success, and a career. He said that there is an infinitely greater gap between the skilled man and the unskilled than there is between capital and labor, and there is an even greater gap which separates the holder of any job from the holder of no job whatsoever.

The battle between C.I.O. and A. F. of L., said Mr. Williams, is not simply a matter of a difference between John Lewis and William Green; it is the difference between those who believe in the stability of the platform at the expense of the ladder—between the C.I.O. masses who want only job security and the A. F. of L. people, who want security plus job-opportunity. He said that the reason the C.I.O. has had its sudden tremendous growth is that it has come to millions of workers who were scared by their experience with depression and has offered to protect them against the unjust loss of their jobs. The weakness of the C.I.O., however, is that when the worker has an employer who makes it unnecessary to worry about the loss of his job, the C.I.O. leader will not permit him to enjoy the differentials in pay offered to skilled men.

Referring to the National Labor Relations Act, Mr. Williams said that he was not optimistic about revising it as the Act is shot through with the false assumption that the worker is interested solely in the job's dollars and that he must consider himself a member of a working class ready to fight for those dollars with the government serving as a not-too-fair umpire.

Mr. Williams said that Great Britain and Sweden have very little to offer as a solution for our labor problem, because in these countries the employers are organized into an organization as rigid as that of the workers. Acceptance of the class lines of Europe over here would destroy opportunity for the worker and limit production by putting it on the basis of class conflict. He said politicians, however, find this approach very attractive because the vote would be easy to control if the worker in America should vote not as an individual but as a member of a working class. Mr. Williams was optimistic of the future because the ordinary wage earner comes to a reasonable, wholesome, constructive point of view if only he is given time.

National Legislation

Raymond S. Smethurst, associate counsel, National Association of Manufacturers, Washington, D. C., led off the discussion on legislation affecting business, particularly as it relates to labor. Mr. Smethurst pointed out that legislation will take the form of direct amendments to the National Labor Relations Act, supplemental legislation growing from the investigations carried on by the La Follette Civil Liberties Committee, and an attempt to modify the Walsh-Healy public contracts law.

The AFL amendments to the Labor Relations Act provide that the craft unit should be the appropriate unit in all cases where there is a craft; that provisions be incorporated encouraging the closed shop contract; that the labor board be denied authority to nullify any existing labor agreements unless it could be demonstrated that they were with a company union or not representing a majority; that an employer may express an opinion on matters of interest to the public or to his employes, provided it is not accompanied by coercion. These amendments further provide that the Labor Board be compelled to file an examiner's report setting forth tentative findings of fact and conclusions of law so that the parties to the proceeding could have the opportunity to file exceptions to the findings; another provision would permit either employer or labor organization to subpœna witnesses. One AFL amendment, among the 37, would provide that the union with which the contract was made would have a vested interest in that contract and it could not be terminated for a period of one year from the date the contract was exe-

cuted, even though the membership should drop off to the point where it did not represent the majority or it had joined the CIO or some other group.

Mr. Smethurst expressed the view that some of the AFL amendments might make the law worse than it is at the present time. The amendment which would take away the authority of the Labor Board to enter into any jurisdictional dispute is designed to prevent any intervention, although the Board as now constituted has made it a policy not to interfere. Giving a union a vested interest in a contract might have some value if it would take the employer from the dilemma now facing him in the presence of two contending unions. Mr. Smethurst said that it must be remembered that the AFL amendments are designed primarily to make the Act more acceptable to one branch of organized labor, and they do not deal with the basic defects in the law, which holds that the interests of employers and employes are absolutely apart and in conflict.

In addition to the amendments offered by the AFL, another bill has been introduced by Representative Anderson from Missouri, which is offered as a substitute for the existing Act. The principal change in this bill, Mr. Smethurst pointed out, would be that the Board would be deprived of the right to proceed with hearings and to find any employer guilty of violating the Act, and this action would be assigned to the various federal district courts.

An indirect method of amending the Act is in the form of amendments to the Walsh-Healy Act. Senator Walsh has introduced a bill extending the Act to include all contracts and subcontracts of $2000 or more, but nothing has been done in this bill to clarify the conflicting jurisdiction or coverage of the Walsh-Healey Act and the Fair Labor Standards Act.

Discussion

In the discussion, a question was raised as to the constitutionality of the law. While it was believed in some quarters that if the precedent of the NRA was observed, the National Labor Relations Act may be declared invalid, it must not be overlooked that there have been many changes in constitutional construction since that time. The question also was raised as to whether two adjacent plants may employ a workman, say each six hours per day, without violating the law. It was agreed that there were no provisions in the law which would prevent such employment so long as collusion between employers was not involved. The Administrator has suggested that an amendment may be made so that when he or his staff has given an opinion that an employer was not subject to the Act in a given case, if the courts should later decide to the contrary, there would be no penalties. It also has been suggested that an amendment be written into the Act permitting the averaging of hours where employes earn a certain stated amount per month or per week so that over a period of a month they would not work over 44 hours a week.

Manufacturers' Exhibit, National Crushed Stone Association Convention, in which you can spot (1) J. L. Heimlich; (3) Max Lambert and Frank Wyse; (7) H. E. Rainer and C. S. Huntington; (9) L. W. Jones, Jr.; (10) F. E. Finch and J. F. Berger; (11) Roy Wills, new chairman, Manufacturers' Division; (13) Otho M. Graves; (14) M. B. Garber

Preventing Kiln Troubles By Finding Cause

Part 3

By W. S. DICKIE*

Two of the most frequently encountered troubles with shells are bowing and warping. Bowing usually occurs on two-tired kilns and is easily recognized by a shell raised in the center and lowered at both ends. A warped shell is out of line at a number of points in its length and is usually met with on a multiple-tired kiln.

An unusual cause for bowing is the action of the sun on a good hot summer day on a standing and unprotected shell. This has been known to happen to a shell while on a car or just previous to its erection to position. If it has not yet been set in position, it should be rolled or turned 180 deg. to present the cold side to the sun if the work must be done immediately. Preferably the work should be done early in the morning or on a cloudy day. If it is an unprotected shell which has been stopped and allowed to remain stopped in the sun for a long period of time, it should be treated as a bowed shell.

However, bowing is usually caused by stoppage occasioned by power shutdown or perhaps some other cause which might result in a kiln's having to be shut down suddenly while still at its operating temperature. What happens then is that the heat in the shell rises to the top of the shell causing expansion of the top part of the shell greater than any that might be encountered in the bottom half so that the center of the span bows upward and turns both overhung ends of the shell downward. A specific case was mentioned in a previous article where a power shutdown resulted in an extremely bad bow, so much, in fact, that it was impractical to do anything except cut the shell apart and realign it.

However, if this bow is not too great —and, incidentally, the severity of a bow is dependent on diameter and length of the kiln—it can be straightened out by turning the bow 180 deg. so that the inside of the bow is at the top. The shell should then be warmed slowly, which causes expansion in what is then the top half of the shell. After it has been brought to a fairly good temperature the shell should be revolved four or five times slowly and again stopped with the inside of the bow at the top. After a short period during which the shell is stationary, it should be again revolved for several minutes, again stopped, and this procedure continued until finally it will be found that the shell has straightened itself out to all practical intents and purposes.

Correcting Alignment of Badly Warped Shell

On a four-tire kiln which was rather small, that is 7 ft. diameter and 120 ft. long, and necessarily of rather ancient vintage, because a kiln of this size would be made two-tired today, the shell, after having been warped a number of times in a number of different places, finally assumed a shape which is commonly called "as crooked as a dog's hind leg." As might be guessed, it was extremely hard to keep this shell in alignment. Here the worst of the evidences of the badly warped shell was eccentric wearing of the gear rings.

Without having had any previous experience in trying to straighten a shell in this shape, the writer suggested that a graph be made showing the existing centerline of the warped shell. Measurements were therefore made on the quarters and the centerline of the shell plotted. The sets of roller or supporting bearings were then set so that they were about on a mean line made by the centerline of the shell as it revolved. Then the roller bearings were adjusted so that there was a slight pressure on the outside of each bow. The shell was heated carefully as is done with a bowed shell and revolved. It was found that the pressure against the rollers when the outside of the bow presented itself was lessening, and the bearings were further adjusted against the outside of the bowing. By continuing this procedure slowly but persistently the shell was straightened to something a lot more reasonable and the uneven wear on the gear ring was eliminated.

One of the most common difficulties with shells is the bulging of the shell due to hot spots which are caused by the falling out of the brick lining in either a ring or a spot. Usually this results in bulges of varying sizes and varying height. If the bulged spot is not too large and the remainder of the shell at the bulge is in fairly good shape, probably the easiest and doubtlessly the best looking cure is to burn out the section which is bulged, making the burned out portion either a more or less crude circle or, if it is rectangular, rounding the corners to a rather large radius and welding in a section of shell of the same size and thickness.

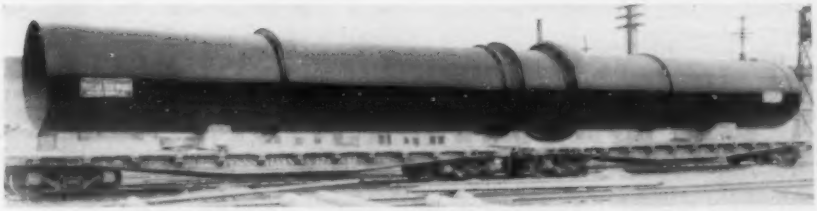
Of course, it is understood that if the bulge covers too large a section of the shell, it is impossible to do this for several reasons: First, the shell alignment would be affected by a large bulge; and second, the strength of the shell is impaired by a large bulge and a welded patch such as suggested above would probably not add to the strength.

When the bulge is too bad, there is only one cure. That is to replace a section of the shell. In the case of a riveted shell, this can be one section between circular joints, and in the case of a welded shell, as much length as is necessary in order to make a straight shell.

If this bulge takes place at a point near the tire, it usually results in the shell going out of line and causes a misalignment of the tire so that instead of getting full bearing between the tire and supporting rollers at all times in the revolution of the tire, it bears first on one side, then all the way across, and then on the other side, and so forth around the tire. This, as can be guessed, strains the fastenings of the tire and eventually causes breakage of the fastenings. We have not seen the case where a tire has been broken completely through this cause, but we believe the only reason there has not been breakage of the tire is because the fastenings are not nearly so strong as the tire itself. Obviously the only cure in this case is replacement of the section on which the tire is mounted, although a temporary repair can be made by loosening the fastenings of the tire and revolving the shell slowly, finding the mean position while revolving, shimming the tire blocks with wedge shaped shims so as to place it about in its mean position, and securing it again in that position. This, although it is not a permanent cure, sometimes will enable the operator to run the kiln for a rather long period of time until the replacement of the section can be made more profitably or desirably.

Another trouble quite commonly encountered, especially with kilns which were installed some time ago, is the burning off of the shell at the discharge end. In former days there was a large

*Engineer in charge, Cement, Lime and Chemical Equipment, Vulcan Iron Works, Wilkes-Barre, Penn.



Welded kiln shell section mounted on flat car ready for transportation

opening between the shell and firing hood which allowed a generous current of cold air to pass around the end of the shell, cooling it to a temperature which was not harmful to the steel. Because of a desire to secure more efficient operation, or perhaps because of keen competition, sealing rings were installed at that end of the shell, thus preventing the current of cold air. As the result of radiant heat, the older designs of shell cannot withstand the temperature without this cold air current and therefore burn off for varying distances.

Trouble Experienced With Shell Burning Off at Discharge End

Since sealing rings are highly desirable, it was necessary therefore to do something to cure this trouble. The first attempt was a change in the design of the shell at the discharge end. A very heavy reinforcing band was attached to the outside of the shell and the shape of the brick retaining nose ring was altered. As a result, the shell was much stronger at that point. This, however, was not the best of cures, and a more recent and better one is effected by installing a heat resisting material for a certain portion of the length of shell at the discharge end. However, while these alloy metals withstand highly elevated temperatures, their strength decreases greatly with these temperatures. Therefore, a still better cure can be obtained by so designing the discharge end that the necessary strength at this point is given by ordinary steel members, and resistance to the action of heat by heat resisting castings. These castings serve also as deflectors of the radiant heat which is the source of a great amount of the difficulty.

We subscribe to the theory that the more carefully the brick lining is placed in a kiln shell the less danger there is of warpage or hot spots in the shell. A carefully installed brick lining adds to the strength of the shell, and there is a great deal less danger of brick falling out if the brick is carefully put in.

Mention was made just above of the installation of sealing rings, which may be installed at either or both ends of the shell. The desirability of concentric revolving of the shell should be very evident to all operators; all designs of sealing rings we have ever seen worked very much better with a straight shell than with one that was warped.

Modern Wet Process Plant

(Continued from page 31)

where coarser particles predominate, and discharging it at a similar level near the periphery, where fine material predominates. This tends toward a uniform particle size distribution throughout the thickener, and is accompanied with no substantial increase in water content of the thickened slurry. It has not been possible as yet to make a complete investigation of various locations for these pipe inlets and outlets since the thickener so equipped has been available for use only a short time. The use of the underflow pump, when not delivering to kiln tanks, for recirculation of thickened slurry to the feed launder of the thickener also appeared to improve moisture and particle size uniformity.

When operating schedules permit, both thickeners may be operated with the same type of slurry in order to take advantage of the greater area and added time of thickening. Two methods are available, first to operate both thickeners in parallel, which will double the settling time of the material; and second, to operate the thickeners in series or tandem. Under the second scheme the fresh slurry stream would always be delivered to one thickener and the underflow from this one would be pumped into the second thickener which would serve as the kiln supply basin.

Delivering Slurry to Kilns

Thickened slurry discharges from the center cone of each thickener through four openings connected to 6-in. pipes feeding a common header. Slurry is delivered through an 8-in. line from this header to a common sump located between the two thickeners. The sump inlet line from each thickener is provided with a fixed orifice and a motor-operated gate valve. The orifice is proportioned to permit a rate of delivery from the thickener slightly greater than the rate of pumping from the sump. The electric valve, which is controlled from floats, maintains the sump level within upper and lower limits.

Two 400 g.p.m. rubber-lined centrifugal pumps deliver the slurry from the sump through an 8-in. line to supply tanks under the kilns. One pump will handle the total kiln requirements, the second is provided as a spare. All of the pumping and electrical equipment is located in a concrete pump house built integrally with and between the two thickeners. In addition to the two underflow pumps, two 3000 g.p.m. centrifugal overflow pumps are provided. These handle the clear water which overflows a peripheral weir around the thickener and return it to the water supply system serving the raw milling department. Thus the only new water added in the system is that which is evaporated in the kilns and lost from the thickeners by leakage or evaporation.

There are no correction basins between the thickeners and the kiln supply tanks. Hence the slurry leaving the thickener must be acceptable as kiln feed without further correction. No difficulty has been experienced in maintaining satisfactory control of the slurry from a chemical standpoint. The correction of raw material proportioning scales according to analyses of the raw mill stream results in a nearly correct daily average mix entering the thickeners, although individual samples may show appreciable variation. The blending in the thickeners smooths out that variation and delivers a kiln feed that is consistently within ½ of 1 percent $CaCO_3$ of the desired holding point. There are four 24-ft. diameter slurry tanks under the kilns, each with a capacity equivalent to about five hours of continuous two-kiln operation. Each tank is provided with mechanical and compressed air agitation. Slurry is pumped in excess of kiln requirements to constant volume scoop type kiln feeders. Overflow from the feeders returns by gravity to the tank from which it was drawn. Feeders are electrically synchronized with the kiln driving motors assuring uniform feed rates per kiln revolution.

Space and structural provisions have been made in the kiln feed and structure to install dewaterers or filters at some future date, if and when it appears desirable.

NOTE: In the April issue of ROCK PRODUCTS, the finish grinding methods and equipment will be described.

ARKANSAS PORTLAND CEMENT CO., Okay, Ark., will convert its plant to the use of natural gas fuel, according to recent reports. A 75-mile pipe line is being constructed from the Cotton Valley field which will cost $356,312.

Mining Engineers Discuss Topics of Interest to Rock Products Men

By NATHAN C. ROCKWOOD
M. Am. Inst. M.M.E.

As usual, the program of the winter annual meeting of the American Institute of Mining and Metallurgical Engineers contained many papers and discussions of great interest and value to producers and processors of rock products—or industrial minerals, as they are officially designated by the Institute.

For the ensuing year Dr. M. M. Leighton, state geologist of Illinois, was elected chairman of the Industrial Minerals Division, and F. B. Reed, his associate at Urbana, Ill., was elected secretary of the Division. Dr. Leighton has been very active in Illinois in contacting the industrial mineral producers of his state, and in promoting the interests of the industry. Under his supervision there will be active committees in the various branches of the Industrial Minerals Division. The fall meeting, 1939, of the Division will be held in October at the University of Alabama, Tuscaloosa, and the fall meeting in 1940, at Urbana, Ill., when the new state geological survey building will be dedicated. The retiring chairman of the Industrial Minerals Division of the Institute is J. R. Thoenen, U. S. Bureau of Mines, who is nationally known to producers of rock products.

Rock Products Papers

At the February 13-16 annual meeting in New York City were many papers both directly and indirectly helpful to rock products men. Many of these were read in abstract form only, but will be available later for abstract and comment. Such a list includes:

"Mining and Preparation of Sand and Gravel in Southern California," by H. D. Jumper, Consolidated Rock Products Co., Los Angeles.

"Modern Trends in Quarry Blasting," by J. Barab, Kelbar Powder Co., Wilmington, Del.

"Detachable Bits," by W. M. Ross, Ingersoll-Rand Co., Phillipsburg, N. J.

"Refinements in Design of Rock-Drill Bits," by Lucien Eaton, Isle Royale Copper Co., Isle Royale, Mich.

"Recent Developments in Drilling Big Blast Holes," by L. B. Birckhead, Bucyrus-Erie Co., So. Milwaukee, Wis.

"Removing Dynamite from Unexploded Well Drill Holes, Drilled in 1912," by V. M. Frey, consulting engineer.

"The Silicosis Problem," by E. H. Nichols, The Funkhouser Co., silica producer in western Pennsylvania and Ohio.

"A Summary of Information on Silicosis," by Dr. R. R. Sayers, U. S. Public Health Service.

"Closed-Circuit Grinding of Cement Raw Material at Leeds, Ala.," by T. B. Counselman, The Dorr Co., New York City.

"New Developments in the Phosphate Fields of Tennessee," by Paul M. Tyler, U. S. Bureau of Mines, and H. R. Mosley, Tennessee Valley Authority.

"Grinding and Calcining Gypsum at the Plant of the Santa Cruz Portland Cement Co.," by R. A. Kinzie, Jr., Santa Cruz, Calif.

"Calcination Conditions for Limestone, Dolomite and Magnesite," by John E. Conley U. S. Bureau of Mines.

"New Application of Electrostatic Separation," by B. C. Burgess, Tennessee Mineral Products Corp., Spruce Pine, N. C.

"The Electric Ear, a Device for Automatically Controlling the Operation of Grinding Mills by Their Sound," by Harlowe Hardinge, Hardinge Co., Inc., York, Penn.

"Preheaters for Rotary Kilns," by Theron C. Tayler, Belle Isle Lime Co., Detroit, Mich.

"New Developments in Industrial Minerals," by Dr. Oliver Bowles, U. S. Bureau of Mines.

"Production of Limestone for Chemical Purposes," by Horace C. Krause, Columbia Quarry Co., St. Louis, Mo.

Lime and Limestone

The program was particularly helpful on the subject of lime and limestone. John E. Conley's paper "Calcination Conditions for Limestone, Dolomite and Magnesite" is a new study and is available as Technical Publication 1037 of the American Institute of Mining and Metallurgical Engineers. The author says the calcination of limestone was studied for a two-fold purpose: (1) to extend information on the mechanism of the lime-burning process and (2) to standardize conditions for calcination of high calcium and dolomitic limestones for subsequent hydration tests on lime.

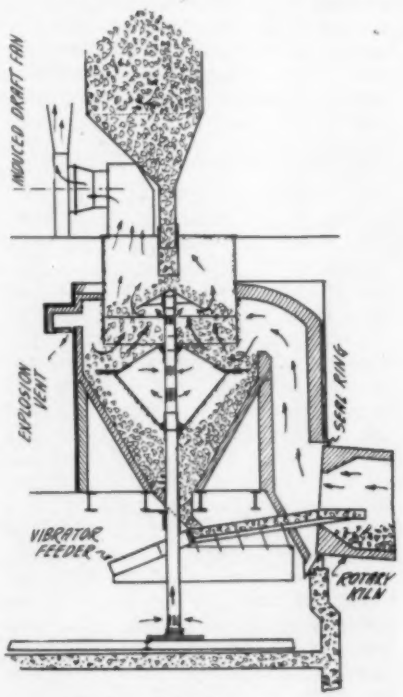
Tests were made on a limited number of cylindrically shaped pieces of limestone to determine decomposition temperatures and the time required for calcination at different temperatures—work that has been done many times before. From these experiments the author arrived at the following formula for the rate of calcination of a limestone at atmospheric pressure, within the range of temperatures studied:

$$R = \frac{0.5254t - 470.2}{100}$$

where R = calcination rate in centimeters per hour, and t = temperature in Centigrade degrees.

Conclusions were that under the conditions studied, dissociation temperatures are indicated as approximately 900 deg. C. for high calcium limestones, 725 deg. C. and 620 deg. C. for dolomite and magnesite, respectively. The rate of calcination, which has been defined as the rate of penetration of the decarbonated zone, according to the author, may be deduced to vary but slightly from a linear function of surface temperature in the range 900 to 1135 deg. C. at atmospheric pressure of carbon dioxide. The paper also includes a useful bibliography.

Theron C. Tayler's paper, "Preheaters for Rotary Kilns" is a thorough-going description of the device he developed



Preheater for Rotary Lime Kiln

for the Belle Isle Lime Co. plant at Detroit, Mich. It has been briefly described in previous issues of ROCK PRODUCTS. The paper also reviews various other attempts and devices to conserve heat in rotary kiln operation. Regarding the operation of his preheater the author said: "It has been interesting to note that a normal gas temperature of 1200 deg. F. (upper kiln gases or flue gases) gives a normal stone temperature of 1060 deg. F., but even more interesting is the fact that stone leaving the preheater (to the kiln) is occasionally hotter than the gases entering the preheater. The reason for this lies in secondary combustion in the preheater. Stratified kiln gases may contain un-

combined C, CO and O_2, which become mixed before passing into the red-hot stone in the preheater and burn there. Of course, this is not the ideal place for combustion, but it is better to get it here than waste the unburned gases. The normal temperature of gases leaving the preheater is 450 deg. F."

While operating under very unfavorable conditions, because production is being pushed and the kiln is not properly insulated, the author has been maintaining monthly average fuel ratios of 1:4, while without the preheater the best would probably be not better than 1:2.7, which is about the average for rotary lime kilns of this size (6x100 ft). This kiln with the preheater attached produces regularly 60 tons of lime per 24 hours, instead of a rated capacity of 40 tons. With the preheater the kiln is rotated 50 percent faster and can be speeded up still more. The total power requirement is 37 hp. It is estimated the fuel saving amounts to 5 tons of coal per day, or $22.50, while the extra power costs $8.00, leaving a net saving of $14.50 per day.

H. C. Krause's paper, "Production of Limestone for Chemical Use," contains a case history of the development of quarrying and mining operations designed to produce limestones of maximum chemical purity. It includes analyses of various ledges and formations quarried. This company found, as have a few others who have followed this specialty business, that recovery of limestone for chemical and metallurgical industries has numerous variations from mere blasting, crushing and screening for commercial crushed stone.

One important point brought out by Mr. Krause was that it is unsafe to judge the analysis of a limestone formation by merely sampling pieces from the exposed face. Much purer stone was proved in one such case by drilling into a bluff, which had frequently been rejected as a source of high calcium stone.

Grinding and Calcining Gypsum

R. A. Kinzie's paper on "Grinding and Calcining Gypsum at the Plant of the Santa Cruz Portland Cement Co.," described the use of an oil-heated Raymond Imp mill to grind and calcine gypsum rock in one operation. The calcined gypsum so made has never been used for plaster or stucco, but merely as an addition to clinker to control the set of portland cement. The paper is chiefly interesting as a commentary on the clinker-grinding installation at this plant, which consists of air-swept Hardinge conical mills. When gypsum rock was added to the clinker in grinding cement, as is the standard practice, the setting of the cement was erratic. This was traced to the fact that the gypsum went through the mill too fast to be fine enough ground, and the air-swept mill gave too low temperatures to calcine the gypsum. That made necessary the installation of a separate unit to grind and calcine the gypsum before it was added to the clinker mill feed.

Raw Material Cement Grinding

The subject matter of the paper by T. B. Counselman on "Closed-Circuit Grinding of Cement Raw Materials at Leeds" is largely covered in the article elsewhere in this issue of Rock Products on the same plant of the Universal Atlas Cement Co. Mr. Counselman's paper goes into greater detail on the grinding and separating part of the operation and gives performance data, hitherto unavailable, on the various steps in the process.

Blasting Practice

J. Barab is a nationally known expert on quarry blasting and his paper, "Modern Trends in Quarry Blasting," is an excellent summary. The author emphasized the necessity of studying each operation and adapting both drilling and explosive to the conditions. Many quarry operators still do not appreciate that practice formerly based on rule-of-thumb alone is now capable of scientific analysis. There has been no radical change in principles, but there have been radical changes in drills which make possible improvements in blasting technique.

Mr. Barab then explained some of the elementary principles, such as the effect on the number of exposed faces of a block of stone in place, to be broken up—the fewer faces exposed the more explosive required. He then covered the various factors which determine whether one selects small drill holes close together or large well-drill holes widely spaced. For example, the use of 9-in. holes reduces the number of otherwise necessary 6-in. holes by 45 percent. While in recent years the trend has been toward 9-in. holes, this size hole is not always in order. The tunnel method, Mr. Barab said, is often the cheapest method but requires the most careful planning of all. Where blasting must be done near neighbors who object, small single-hole blasting may still be done efficiently.

Harlowe Hardinge described his "electric ear" in considerably more detail than in the article published in the January issue of Rock Products. His invention has attracted a good deal of popular interest and this was one of the papers given considerable publicity in the newspapers. One point of much interest to wet-process portland cement manufacturers, not brought out in the article in Rock Products, is the possible use of the electric ear for the control of density in wet grinding, both in open and closed circuit. Mr. Hardinge says: "A simple means has been devised to maintain the density constant within the grinding circuit. The method maintains the density constant at the outset rather than corrects a change after it has occurred."

Electric Ear in Grinding

The desired result is obtained by feeding the mill with a weighing type feeder and controlling the operation of this feeder with the electric ear, and at the same time supplying the water to the mill from a constant-head source through a valve that is also controlled by the electric ear. When the mill is fed hard or coarse material and the grinding rate reduced, the amount of water would be simultaneously reduced.

The paper includes some performance data at the plant of the International Nickel Co., Copper Cliff, Ont., where a 6½-ft. x 12½-ft. ball mill, peripheral discharge type, running at 23.1 r.p.m., in closed circuit with a 12-ft. Dorr FX classifier, had a monthly average output of 1127 tons per 24-hour day of 14.99 percent plus 65-mesh product without the electric ear control and about 1300 tons afterward.

Tennessee Rock Phosphate

The paper on "Recent Developments in the Tennessee Phosphate Industry," by Paul M. Tyler and H. B. Mosley gives the result of a survey and investigation to determine the extent of these resources. The discussion includes the geology of the region, prospecting, mining methods, washing, drying, market grades and prices, furnace factors, economic factors and costs, and a bibliography. It is obtainable as Technical Publication No. 1053 of the American Institute of Mining and Metallurgical Engineers.

Silicosis

Dr. R. R. Sayers' discussion of silicosis was a plea for sanity in approaching the problem. He deplored the use of the term "acute silicosis," as it is not an acute disease, but an aggravated condition brought on only by long exposure. The rest of his paper was a summary of a recent international conference on silicosis. He admitted that there is as yet very little positive knowledge on a great variety of details.

Sand-Lime Brick Manufacturers Becoming Large Users of Cement

When experimenters in the use of portland cement discovered the advantages of treating concrete with high pressure steam, for considerable periods, one group of products manufacturers was ready to take immediate advantage. This was the sand-lime brick industry, for the process used here is identical with highpressure, steam-cured concrete products manufacture, except that lime is the cementing agent instead of portland cement.

The great advantages of high-pressure steam curing concrete products are (1) that it reduces shrinkage of the concrete to a minimum, (2) that strong concrete can be made with exceedingly lean mixes—as lean as 1 part cement to 12 parts sand (or other graded aggregate). These two objectives can be accomplished by drier and more intimate mixes than provided by the average concrete mixer; and, by high-pressure steam curing, the development of bonding or binding agents which do not exist in portland cement when it is hydrated and hardened in the ordinary way.

One of the best examples of a sand-lime brick manufacturer who has gone into the high-pressure steam-cured concrete products business in a big way is Harold J. Levine, National Brick Co., Long Island City, N. Y. His building units are being used in very large quantities on various new housing projects in New York City. The blocks that he is making for this purpose are made of cinder aggregates. Mr. Levine told the members of the Sand-Lime Brick Association something about this part of his business at the association's recent convention in St. Louis, Mo. (February 6 and 7).

The part portland cement plays or may play in high-pressure steam curing was discussed informally by Dr. Lansing S. Wells, National Bureau of Standards, Washington, D. C., using as a basis for his remarks the research work done at the Bureau by E. P. Flint, H. F. McMurdie and Dr. Wells, published in November, 1938, as R. P. 1147. The title of this paper is "Formation of Hydrated Calcium Silicates at Elevated Temperatures and Pressures." The authors attempted to identify some of these silicates by comparing them with silicates found in nature. The main point of interest to concrete products manufacturers is that high-pressure steam curing, or auto-claving cement, produces silicate binders that do not exist in concrete products cured in the ordinary way.

The rest of the program at the Sand-Lime Brick Association convention included a review of the activities of the association in 1938 by C. H. Carmichael, Atlantic Brick Co., Watertown, Mass.; a history of the association from the year one, by John L. Jackson, the daddy of the sand-lime brick industry in America; a brief talk on lime and lime-cement mortars by John Stockett, National Lime Association, Washington, D. C.; a discourse on lime manufacture by Dr. H. E. Wiedemann, consulting chemist, St. Louis, Mo.; a paper by Dr. R. P. Benjamin, paint expert of the National Lead Co., whose remarks about the use of oil paint on sand-lime and concrete building units were subsequently considered misleading; a brief discussion by J. W. Van Brunt, Grande Brick Co., Grand Rapids, Mich., on the manufacture and promotion of double sand-lime brick building units.

J. C. R. Felker, President of N.S.L.B.A.

The second day of the convention was used largely for an informal round-table discussion of production and sales—most of it on sales promotion methods. T. H. Lineweaver, Grays Ferry Brick Co., Philadelphia, Penn., described a direct-by-mail campaign which is proving quite effective. Nathan C. Rockwood, editor, ROCK PRODUCTS, called attention to the monthly statistics he publishes on sand-lime brick production and prices, and urged manufacturers to make greater use of this page to tell about important orders received, or interesting building jobs served.

During the afternoon the association members and guests were taken by special bus to some of the jobs furnished by the Missouri Hardstone Brick Co., St. Louis, Mo., and then to the plant of the company at Pacific, Mo., where a careful inspection was made of every detail. This plant uses St. Peter sandstone, quarried from a bluff behind the plant. This is the same geological formation extensively quarried around Ottawa, Ill., and Pacific, Mo., for glass sand.

Officers Reëlected

J. C. R. FELKER, St. Louis, Mo., was reëlected president for the ensuing year; W. A. Smythe, Toronto, Ont., vice-president; J. Morley Zander, Saginaw, Mich., secretary-treasurer. The executive committee, in addition to the officers, includes C. H. Carmichael, Watertown, Mass., T. H. Lineweaver, Philadelphia, Penn., and J. L. Finkbeiner, Detroit, Mich. It was unanimously voted to make John L. Jackson, Saginaw, Mich., an honorary member. New York City was selected for the 1940 annual convention.

Registration

Atlantic Brick Co., Watertown, Mass., C. H. Carmichael.

Block & Brick, Inc., Detroit, Mich.

Genesee County Brick Co., Flint, Mich., F. Langdon Hubbard.

Boice Brothers, Pontiac, Mich., Mr. Cromis.

Bureau of Standards, Washington, D. C., Dr. Lansing S. Wells.

Grande Brick Co., Grand Rapids, Mich., J. W. Van Brunt.

Grays Ferry Brick Co., Philadelphia, Penn., T. H. Lineweaver.

Jackson & Church Co., Saginaw, Mich., John L. Jackson.

Michigan Pressed Brick Co., Detroit, Mich., J. L. Finkbeiner.

Missouri Hardstone Brick Co., St. Louis, Mo., J. C. R. Felker, C. G. Miller, O. E. Schuricht, Wm. Wolf, Henry Priesmeyer.

Mutual Materials Company, Seattle, Wash., Elmer R. Coats.

National Brick Co., Long Island City, N. Y., Harold J. Levine, John Garcia.

Northern Indiana Brick Co., Mishawaka, Ind., Frank Perkins, W. F. C. Dall, C. A. Perkins.

National Lime Association, Washington, D. C., John Stockett.

Paragon Plaster Co., Syracuse, N. Y., Donald C. Wood.

Rock Products, Chicago, Ill., Nathan C. Rockwood, editor.

Saginaw Brick Co., Saginaw, Mich., J. Morley Zander.

Sioux Falls Pressed Brick Co., Sioux Falls, S. D., Carl E. Olson.

Sun Building Material Co., Dearborn, Mich., W. W. Kutsche.

Mr. Adolphson, Sioux Falls, S. D.

Chas. E. Miller, St. Louis, Mo.

W. E. Sohrmann, St. Louis, Mo.

H. E. Wiedemann, consulting chemist, St. Louis, Mo.

Lime Putty Producers Hold Meeting

INASMUCH as the operators of the majority of the lime putty plants in the country are also operators of ready-mixed concrete and sand and gravel plants, the annual meeting of the Lime Putty Products Association is held each year in connection with the National Sand & Gravel and National Ready-Mixed Concrete Association conventions.

The meeting was presided over by Irving Warner, president of the association, and a round table discussion was held. Members came prepared with cost data and sales data and practically every member present exchanged this data with the other members, and operating problems and sales problems were discussed openly for approximately two hours.

Very little advertising has been used by any of the operators of lime putty plants dependence being placed on direct contacts with customers. In some instances, brick mason tool bags were used as an advertising medium. It was suggested that each operator obtain letters of recommendation from contractors and architects who had used the lime putty sanded mortar in the various cities and that these testimonial letters be reprinted and furnished to each operator to be used for advertising. Durando Miller of the Colonial Sand and Stone Co., of New York exhibited photographs showing a new truck which they are using to deliver 1 cu. yd. boxes of lime putty to be used for white coat plastering work. This truck, composed of a flat body, has a capacity of eight 1-cu.-yd. steel boxes. These boxes are unloaded by a crane on the truck, which operates from the power of the truck motor. When empty, these 1-cu.-yd. containers are picked up by this specially equipped truck.

The following members and prospective members were present:

Brooks-Taylor Co., Birmingham, Ala., Hayden Brooks.

Chicago Bridge & Iron Co., Chicago, Ill., M. E. Smith.

Colonial Sand & Stone Co., New York, N. Y., Durando Miller.

Concrete Construction & Supply Co., Columbia, S. C., Stanley Smith.

General Materials Co., St. Louis, Mo., H. F. Thomson.

Hough, Norman, Philadelphia, Penn.

Jahncke Service, Inc., New Orleans, La., Herbert Jahncke.

Louisville Lime Mortar Co. Louisville, Ky., Glenn C. Cook, Robert Green.

National Lime Association, Washington, D. C., J. W. Stockett.

Pit & Quarry, Chicago, Ill., S. A. Phillips.

Rock Products, Chicago, Ill., Nathan C. Rockwood.

Richter Concrete Corp. Cincinnati, Ohio, Louis Richter, Julius Richter.

State Sand & Gravel Co., Indianapolis, Ind., W. L. Heston, Russell Prall.

Super Concrete Corp., Washington, D. C., John Redd, Murray Simpson.

Warner Co., Philadelphia, Penn., Irving Warner.

Registration of Active Members National Crushed Stone Ass'n

Listed below is the registration of crushed-stone producers at the convention in Cincinnati, Ohio, January 30 to February 1, inclusive.

Acme Limestone Co., Pt. Spring, W. Va., J. T. England, J. A. Rigg, Alderson, W. Va., E. R. Roush, A. W. McThenia.

American Limestone Co., Knoxville, Tenn., R. P. Immel, Strawberry Plains, Tenn., J. O. Norton.

Blue Rock, Inc., Washington C. H., Ohio, Harold B. Biehn.

Boxley, W. W. & Co., Roanoke, Va., L. J. Boxley.

Buffalo Crushed Stone Co., Buffalo, N. Y., James Savage.

Callanan Road Improvement Co., S. Bethlehem, N. Y., B. R. Babcock, J. R. Callanan.

Campbell Limestone Co., Liberty, S. C., W. B. Couch, Gaffney, S. C., J. M. Pirkey, C. M. Sims, Greenville, S. C., O. D. Tatum.

Carbon Limestone Co., Youngstown, Ohio, Charles Coburn, F. O. Earnshaw, H. W. Feather, Philip E. Holm, Joseph H. Jackson, R. C. Shepherd.

Cedar Bluff Quarry, Princeton, Ky., W. C. Sparks.

Central Rock Co., Lexington, Ky., T. W. Havely.

Columbia Quarry Co., Columbia, Ill., E. A. Heise, St. Louis, Mo., E. J. Krause, Horace C. Krause, Columbia, Ill., Giani Pasquale.

Consolidated Quarries Corp., Atlanta, Ga., G. A. Austin, A. B. Kirkland, Lithonia, Ga., Nelson Severinghaus.

Dolese & Shepard Co., Chicago, Ill., Wm. J. Schwass, Wm. J. Stoffel.

Dubuque Stone Products Co., Dubuque, Ia., Paul M. Nauman.

Elmhurst-Chicago Stone Co., Elmhurst, Ill., M. M. Bales, G.F. Hammerschmidt, C. J. Hartley, Ted Woeller.

Erie Stone Co., Indianapolis, Ind., Dana C. Ward.

Federal Crushed Stone Co., Buffalo, N. Y., H. E. Rainer.

Federal Materials Co., Cape Girardeau, Mo., Norman L. Hely.

Franklin Limestone Co., Nashville, Tenn., A. B. Rodes, H. E. Rodes.

General Crushed Stone Co., Easton, Penn., I. H. Boggs, M. Bovee, Otho M. Graves, D. C. Hickey, Redington Moore. John Rice, Jr., Phelps, N. Y., L. M. Croll. Watertown, N. Y., H. R. Cox, W. Chester, Penn., E. E. Dotter, Oriskany Falls, N. Y., Latham B. Gray, LeRoy, N. Y., J. D. Hawthorne, Syracuse, N. Y., F. F. McLaughlin, F. C. Owens, A. G. Seitz, Rochester, N. Y., Geo. E. Schaefer.

Hopkinsville Stone Co., Hopkinsville, Ky., A. M. Andrew.

Hy-Rock Products Co., Marengo. Ind., Barrett H. Bullington, Manford Grant, Mills H. Hughes, Roy Priest.

Jointa Lime Co., Glens Falls, N. Y., H. J. Russell.

L. & M. Stone Co., Utica, N. Y., Milo Crouse.

Lehigh Stone Co., Kankakee, Ill., Dan Sanborn.

LeRoy Lime & Crushed Stone Co., LeRoy, N. Y., H. E. Coleman, J. L. Heimlich, W. R. Heimlich.

Liberty Limestone Corp., Rocky Point, Va., J. C. Lawrence.

Lynn Sand & Stone Co., Swampscott, Mass., Ted Cooke.

Marble Cliff Quarries, Columbus, O., Paul R. Anderson, R. W. Bower, E. H. Humberstone, W. H. Margraf, Russell Rarey.

National Crushed Stone Association, Ruth Bannerman, J. R. Boyd, Beaulah M. Davies, A. T. Goldbeck, J. E. Gray.

New Castle Lime & Stone Co., New Castle, Penn., K. O. Brown, Elwood Gilbert, Edenburg, Penn., Lester G. Miller, Connellsville, Penn., A. L. Schreckenghost.

New Haven Trap Rock Co., Plainville, Conn., R. D. Brewer, A. L. Worthen, New Haven, Conn., Wm. E. Hilliard, Rocky Hill, Conn., W. F. Quinn.

New York Trap Rock Corp., New York, N. Y. Wilson P. Foss, Jr., Carl J. Stenz, Stirling Tomkins.

New York State Crushed Stone Association R. R. Litehiser.

North American Cement Corp., New York N. Y., A. R. Couchman.

Old Colony Crushed Stone Co., Weymouth Mass., Anthony L. Cassero, Irving E. Johnson.

Ohio & Indiana Stone Co., Indianapolis Ind., N. E. Kelb, Greencastle, Ind., F. E. Weaver.

Ohio Marble Co., Piqua, O., A. Acton Hall

Palmetto Quarries Co., Columbia, S. C., T. M. Hanna, George D. Lott, Jr.

Pembroke Limestone Corp., Pembroke, Va., T. P. Smith.

Pennsylvania Stone Producers Association, H. H. Wagner.

Radford Limestone Co., Radford, Va., W. B Bobbitt.

Raleigh Granite Co., Greensboro, N. C., R. B Arthur, Charlotte, N. C., E. B. Young Raleigh, N. C., H. M. Shaw, Robert B Shephard.

Reinhold & Co., Inc., Pittsburgh, Penn., Paul B. Reinhold.

South Carolina Granite Co., Columbia, S. C., D. E. Saunders.

Southern Ohio Quarries Co., Chillicothe, O., Geo. F. Driscoll, Peebles, O., R. S. Leboid, Columbus, O., H. C. Slater.

Southwest Stone Co., Dallas, Tex., W. F. Wise.

Sunnyside Granite Co., Inc., Richmond, Va., C. S. Luck, Jr.

Trego Stone Corp., Skippers, Va., C. W. Lucas.

Union Limestone Co., New Castle, Penn., Wm. M. Andrews, Forrest W. Raub, W. J. Usselton.

Watauga Stone Co., Johnson City, Tenn., Thomas McCroskey, Jr.

Weston & Brooker Co., Atlanta, Ga., J. E. Boyd, Columbia, S. C., L. J. Burriss, A. K. Reuker, Richard Simons, T. I. Weston W. S. Weston, Thomson, Ga., H. L. Bynum R. A. Hemphill.

Williams, Harold, Boston, Mass.

COLONIAL SAND AND STONE CO., INC., New York, N. Y., is doubling the capacity for lime putty at its Astoria, L. I. plant by installation of two additional ageing tanks. The original plant, built in 1937, had four ageing tanks and is the largest plant in the country manufacturing aged lime putty by the Brooks-Taylor process.

HINTS AND HELPS for Superintendents

Screen Discharge

FREQUENTLY vibrating sizing screens are mounted over bins and the products discharged fall directly into the bins or to chutes which lead to bins. Often the drop of material is very considerable, and when this happens breakage of sized stone or gravel is a factor to be reckoned with, not to mention dusting caused by new abrasion and breaking.

Usually the discharge of oversize from a vibrating screen comes off the end of the screen with considerable initial velocity. Wherever it lights there is going to be wear, and possible fracture of the piece of aggregate.

To reduce this wear and breakage one large gravel plant on the West Coast uses a device illustrated in the two accompanying views. Instead of plunging off the end of the screen into a chute hopper, the material hits a trough about 6 in. beyond the end of the screen. This trough fills up with pieces of aggregate, which take the wear and abrasion. The aggregate, its impact absorbed and the velocity stilled, now falls on steel deflector vanes, which are there partly to check the velocity of pieces of aggregate which fall short of the stone-filled trough. Similar troughs or shelves, staggered, in a vertical chute, with intervening vanes to direct the flow toward them, would obviously not merely save breakage and abrasion of aggregate and chutes but help materially to prevent segregation in the bin below.

Pipe Bends

MOST OPERATORS know from experience that right-angle bends in pipe lines considerably increase frictional resistance to flow. Many do not pay much attention to it. An increase in frictional resistance is equivalent to an increase in head and therefore adds to the plant's power bill. The friction is least when the radius of the bend is three times the diameter of the pipe. Now that most plants have their own welding equipment, operators can with a little ingenuity make pipe bends for themselves. The illustration herewith shows such a home-made welded pipe bend at the Radum, Calif., plant of the Henry J. Kaiser Co. This pipe is carrying wash water. In the case of pipe lines carrying sand and gravel as well as water, the avoidance of sharp bends is of course even more important because in that case not only is pumping resistance increased but there is extra wear at the bend.

Welded pipe bend, designed to reduce friction to a minimum

Solve Stone Storage Problem With Drag Scrapers

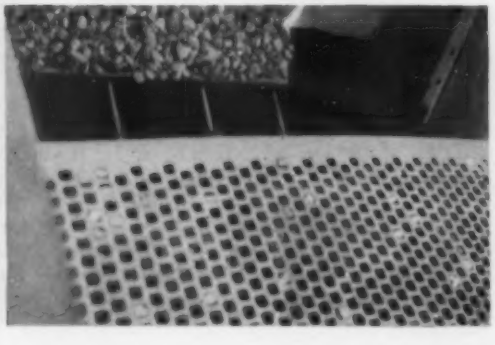
VALLEY DOLOMITE CORP., near Bonne Terre, Mo., had a somewhat difficult storage and reclaiming problem in handling a variable surplus output of two different products. The quarry contains a dolomite of a quality particularly suitable for special processing. Output reaches a maximum of about 850 tons per day; part of the crushed product goes to the calcining plant and the remainder, comprising screenings or dust, is sold for agricultural purposes.

Two Sauerman scrapers provide an economical method of handling material in open storage to accommodate the occasional surplus production of crushed dolomite, which may reach a peak of 6000 tons during the season, and to take care of a 25,000-ton seasonal surplus of agricultural stone.

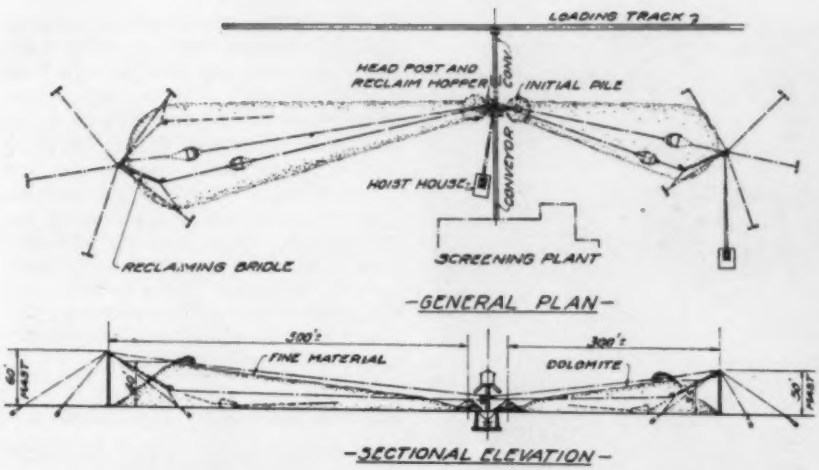
Crushed stone storage is handled by a ¾-cu. yd. Crescent bucket operating on a 300-ft. span between a 50-ft. mast and a tailpost. Dust storage is handled by a 1 cu. yd. Crescent bucket operating on a 500-ft. span between a headpost and a 70-ft. mast. The illustration shows the layout of the double scraper system.

In commenting on the system, C. M. Day, secretary-treasurer of the company, said, "In storing our dust, the advantage of the scraper to us is that it allows us to take material from a loading point, stockpile the material over a relatively large area, and whenever desired, reverse the position of the bucket on the operating cables and bring the material back to the loading point. With the present 500-ft. span layout using a single tail mast, this scraper can pile up over 25,000 tons of material and the size of the storage pile can be doubled, if necessary, by using two tail masts."

With regard to the method of han-



Left: Trough about 6 in. beyond end of screen which takes part of wear and abrasion of falling stone and steel deflector vanes to check velocity of aggregates. Below: Showing end of screen and trough



General plan and sectional elevation of drag scraper installation for handling two different crushed-stone products

dling crushed dolomite, the problem is somewhat different. As the stone bins do not provide ample storage, it is necessary to carry an additional 5000 to 6000 tons of crushed stone in a storage pile. This stone is put out in the pile during periods of good weather when maximum operation of quarry and crushing plant produce a surplus of crushed stone. The stone is reclaimed only at long intervals when either a serious breakdown or prolonged bad weather curtails production to a point below the current needs of the processing plant. These conditions require a method of stockpiling and reclaiming which is low in first cost.

Replace Pug Mill Babbitted Bearings With Anti-Friction

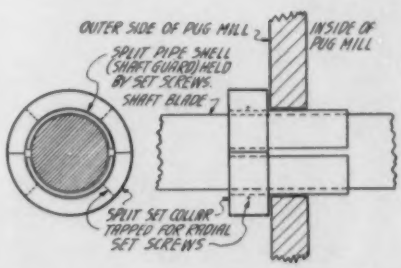
By ROBT. A. HARKER

AFTER MUCH TIME AND EXPENSE had been expended on rebabbiting the bearings as well as building up and turning to size the worn shaft journals on a double shaft 3000-lb. Geiger Iron Works pug mill, it was finally decided that it would be an economy to install anti-friction bearings.

After considerable investigation of the types available, it was decided to use the heavy duty Link-Belt-Timken, ball-and-socket pillow blocks ($3\frac{7}{16}$-in.) equipped with labyrinth dust seals and steel "flinger" collars at both ends. In order to allow for the additional backing and different shape of the housing, it was necessary to make up special welded steel brackets and bolt them to the cast iron sides of the pug mill.

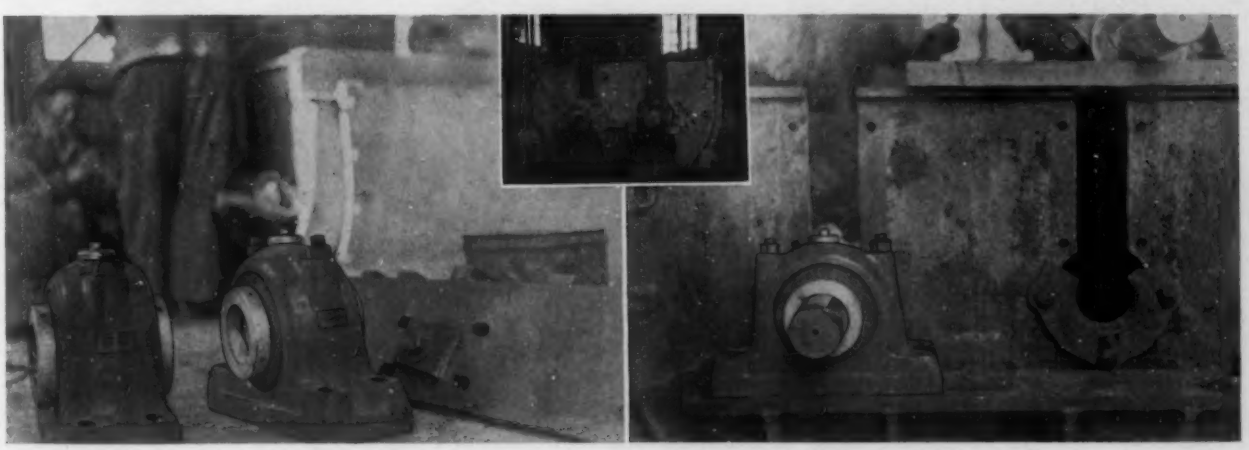
Incidentally, it was necessary to cut off the old brackets, which were cast integral with the pug mill sides. We had been advised against cutting with the acetylene torch due to the danger of straining the main casting as well as the usual difficulty encountered in cutting cast iron by this method. Consequently, we resorted to another method. The old brackets were cut off by using a heavy-duty, high speed steel power hack saw blade 21 in. long set up on special home-made hand frames to fit the job. Some of the cutting was accomplished by electric drilling holes at close centers and breaking the casting away. In other places that were inaccessible, excellent results were obtained by "creasing" the casting with an Ingersoll-Rand chipping hammer and then breaking with a slow even pull while chipping. The new welded steel brackets, designed and furnished by the original manufacturer, were then bolted in place. Any slight misalignment of the brackets is of no consequence in this particular installation since the pillow blocks are of the ball and socket type and align themselves.

At the same time the new bearings were installed, a set of four special shaft guards were made up and installed to prevent the mix from leaking out of the pug mill between the shaft and side of the mill. They also prevent the new shaft from "bottle-necking" due to the abrasive action of the mix packing at this point as it had done in the past. These shaft guards are simple in construction and consist of a split pipe shell and split, cast set-collar equipped with four equally


OUTER SIDE OF PUG MILL
INSIDE OF PUG MILL
SPLIT PIPE SHELL (SHAFT GUARD) HELD BY SET SCREWS.
SHAFT BLADE
SPLIT SET COLLAR TAPPED FOR RADIAL SET SCREWS

Showing how anti-friction bearings replaced babbitted bearings on pug mill

spaced radial set-screws to hold the pipe shells tight with the rotating shaft. The sketch shows this part of the installation. They also keep the mix from spilling on the new bearings and act as an extra set of flinger collars set close to the end of the mill.

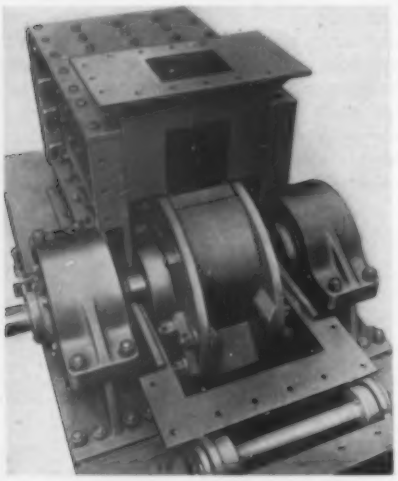


Left: Anti-friction bearings being installed on pug mill. Center, inset: Original pug mill bearings. Right: New bearings being installed

NEW MACHINERY AND EQUIPMENT

Impact Crusher of Unusual Design

NORDBERG MANUFACTURING CO., Milwaukee, Wis., has developed an impact crusher for secondary crushing which is



Showing impact plate which strikes material as it enters crusher

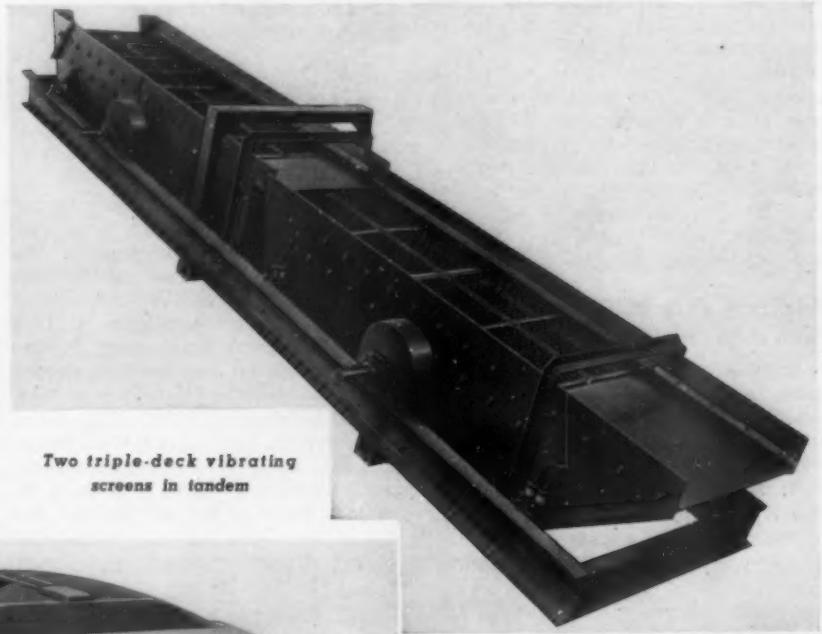
of unusual design. The velocity of the incoming feed is so timed in relation to the impeller speed that the entire area of the impact plate strikes material as it enters the crusher.

With the full surface being utilized for crushing, and the material struck at right angle with no angle of slip, wear is said to be even over the full area of the impact plate. After receiving its initial crushing by impact at the propeller, the material is projected forward horizontally and strikes the heavy stop plate where it is further reduced in size. This material, as it comes onto the stop plate, moves so fast that the particles which have been previously discharged from the impeller, do not have a chance to fall away and are struck by more discharged material. It is claimed that this bed of material not only protects the stop plate from wear but, with material impinging on material, further crushing takes place at this point. It is said that this action is largely responsible for the elimination of sharp points and corners and aids in making a more cubical product.

Various applications are claimed for this impact crusher, including the production of chips, granules, stone sand, agstone, materials for stabilized and black top roads, and reduction of pea gravel to sand. It also is adaptable for use as a soft stone eliminator.

Screen Produces Six Sizes

PIONEER ENGINEERING WORKS, INC., Minneapolis, Minn., has developed a double eccentric 4- x 22-ft. tandem vibrating screen. By using this mounting, two inclined vibrating screens may be operated in tandem, one power unit driving both screens. The screen is a triple-deck type which will produce six sizes simultaneously. Each size has a full screen deck. Capacity depends on the material being handled.



Two triple-deck vibrating screens in tandem

Combination scraper and haulage unit for stripping operations

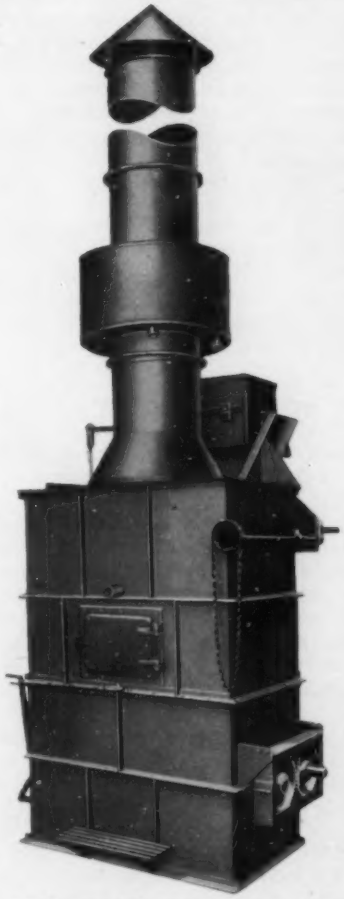
Time-Saving Earth-Remover

KOEHRING CO., Milwaukee, Wis., has developed an earth-removing unit of unusual design. The Koehring Wheeler, as it is called, is pulled by a rubber-tired tractor for operation on highways at speeds of 18 to 20 miles per hour. In stripping operations, the hinged scraper bottom is lowered into position, scoops up a load, and is then pulled up into position by a hoist. To provide the

additional power and traction required for loading, a crawler type push tractor engages the heavy steel bumper at the rear of the wheeler. The new unit has 21-in. clearance in hauling position but is flat on the ground for easy loading.

Batch Type Lime Hydrator

ARNOLD & WEIGEL, INC., Woodville, Ohio, has designed and is now marketing the "Weber Jr." lime hydrator which handles two tons of raw lime per hour. It is of the batch type and for small producers, and it is claimed that its design insures control of operation and uniform batches of hydrate. Thorough mix and agitation with equalized water distribution is said to insure a constant product.



Small capacity lime hydrator of the batch type

Hauling Unit Operated by Gear-Driven Hoist

SPEED DUMP, INC., New York, N. Y., is manufacturing a hauling unit known as the Speed Dumper for use in quarries and for placing concrete from a central mixing plant. This unit is said to be adaptable to any standard truck chassis, and consists of a nest of five or more 2-cu. yd. steel buckets and a two-way worm and gear-driven hoist. The hoist may be lowered to the full length of its cables, and the raising, lowering and dumping of the bucket is power controlled from the cab by the driver.

Bucket ready to be elevated by power hoist

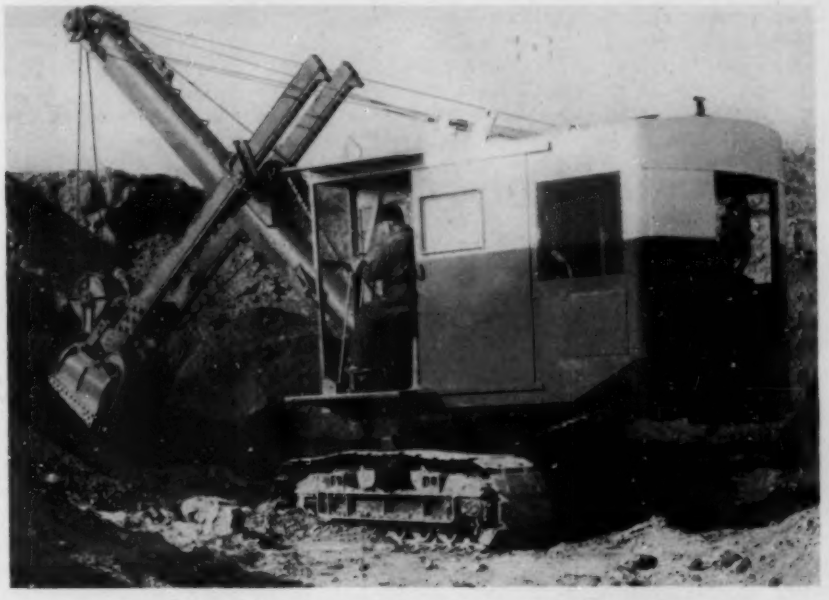
Improve Conveyor Belting

UNITED STATES RUBBER CO., mechanical goods division, has announced an improvement in their conveyor belt construction. The refinement is said to be accomplished by imbedding a special weave breaker-strip fabric in a heavy layer of soft white gum. This layer is inserted next to the belt carcass as an integral part of the belt cover, and provides it with a shock absorbing cushion.

Maximum Excavator Speed Secured By Balanced Units

THE MARION STEAM SHOVEL CO., Marion, Ohio, has made several improvements in its type 331 machine of ¾ cu. yd. capacity.

These improvements include: tubular, all-welded steel boom, anti-friction bearings at each important point, cone type rotating clutches controlled by a single lever, chain crowd for positive control and easy boom adjustment, bevel gears enclosed in oil, guarded boom points, and positive locks on swing shaft, which prevent the upper frame from rotating while propelling. The illustration shows the machine in action.



Excavator of ¾-cu. yd. capacity has tubular, all-welded steel boom

NEWS about People

ANSEL T. ROGERS, formerly chief, concrete division of the building department of the District of Columbia, was named manager of the technical service department, North American Cement Corp. with offices in New York City on February 1. Prior to his last affiliation in Washington, D. C., Mr. Rogers had been with the engineering department of the Southern Pacific railroad and had been a designer in the municipal architect's office in Washington.

•

T. G. MOONEY, former manager of the technical service department, North American Cement Corp., is now the general manager of The Pozzorite Corp., New York, N. Y., manufacturer of volcanic pozzolana products.

•

A. V. LEMASTERS has been made treasurer of the Lone Star Cement Corp., New York, N. Y., to fill the position left vacant by the death of H. H. Muehlke. Mr. Lemasters was formerly assistant secretary and treasurer of the company.

•

W. G. PERROW, district manager of Lehigh Portland Cement Co., at Spokane, Wash., is a nominee for election as president of the Pacific Northwest Advisory board at the annual meeting in Portland, March 17. Mr. Perrow has been vice-chairman of the board for the last two years while L. C. Newlands of the Oregon Portland Cement Co., Portland, Ore., has been president.

•

MAX BERNS has been placed in charge of advertising for the Universal Atlas Cement Co., Chicago, Ill., and will have his office in New York City. A. E. Webster will assist Mr. Berns, and H. G. Farmer will head the technical service bureau.

•

JAMES H. ACKERMAN has been elected vice-president in charge of sales, Lawrence Portland Cement Co., New York, N. Y.

•

JOHN H. MAYER, chief engineer of the Alabama Asphaltic Limestone Co., Birmingham, Ala., has been elected president of the Alabama section of the American Society of Civil Enginers.

L. P. PRICE of the Ready-Mix Concrete Co., Ltd., Honolulu, T. H., has been the guest of three conventions in the United States and is planning to visit a number of plants before he returns to Hawaii. He traveled over 4000 miles to attend the recent conventions of the National Sand and Gravel Association and National Ready Mixed Concrete Associations in Cincinnati, and the Concrete Industries conventions in Chicago. Mr. Price formerly lived in San Francisco, Calif., but has been a resident of Honolulu for the past four years. He was working as an engineer with a San Francisco building firm when the company obtained a contract from the United States Navy to do some construction work at the Pearl Harbor navy base in Hawaii. He received an offer to become assistant manager of the company in the islands for which he is now employed. Mr. Price, when interviewed, said that the islands are so beautiful that he hoped to enjoy them the rest of his life. Living conditions, he said, are ideal.

L. P. Price

•

R. A. FULTON is the new manager of the Morrow County Sand and Gravel Co., Mt. Gilead, Ohio. Mr. Fulton came from Clearwater, Fla.

Obituaries

JAMES M. GAGER, president of the Gager Lime Manufacturing Co., Chattanooga, Tenn., died as the result of a heart attack on January 30 at the age of 59. His death was a shock to his family and many friends, and the industry has lost one of its most constructive workers. He was treasurer of the Gager Lime Manufacturing Co. until the death of his father, the founder of the company, in 1926, when he became president. Mr. Gager has been active in the National Lime Association, and at the time of his death was a member of the association executive committee. He had also served as a director of the association.

•

M. M. EVERHARD, a sales representative for the Crab Orchard Stone Co., Crossville, Tenn., died of a heart attack February 9 while in the First National Bank of Massillon, Ohio. He was 65 years of age.

•

STANFORD T. CRAPO, long a leader in the industrial and financial life of Michigan, died January 26, at the age of 73 at his winter home in Tyron, N. C. After graduation from Yale University in 1886, he started working for the Flint & Pere Marquette Railway and became general manager before retiring. He was a director of the railroad until last year. From 1903 to his death, Mr. Crapo was actively engaged in the construction and operation of cement mills at Wyandotte and Alpena, becoming vice-president and secretary of the Huron Portland Cement Co., Wyandotte Portland Cement Co., and the Huron Transportation Co.

•

GEORGE L. RAETHER died suddenly on January 19 at his home in Port Colbourne, Ont., Canada, at the age of 63. He was a graduate of Kutztown State Normal school and Muhlenberg college, and served as chemist with the Lehigh Portland Cement Co., in its West Coplay and Fogelsville plants. When the company opened mills in Canada, Mr. Raether was appointed chief chemist, and when the Canadian Cement Co. was formed he became the chief chemist for that corporation, the position he held at his death.

•

E. H. GERBER, owner of Del Paso Rock Products Co., Sacramento, Calif., died January 21 at the age of 55.

•

JOHN M. BUCKLAND, president of the National Slag Co., Allentown, Penn., died February 14, at the age of 62.

CONCRETE PRODUCTS AND CEMENT PRODUCTS

Profits In Efficient Stockpiling

View of Bennett Concrete Stone Co., Cleveland, Ohio plant and stock piles of various sizes of units

BESSER PLAIN PALLET STRIPPERS

LEADERS IN THE CONCRETE PRODUCTS INDUSTRY

Plain Pallet Tamper Strippers

Plain Pallet Vibrator Strippers

Besser Super Automatic Plain Pallet Stripper—Daily Capacity 3000 to 4000

Besser Victory Automatic Plain Pallet Stripper—Daily Capacity 2000 to 2500

Besser Semi-Automatic Plain Pallet Stripper—Daily Capacity 1200 to 1500

Besser Champion Power Operated Plain Pallet Stripper—Daily Capacity 1000 to 1200

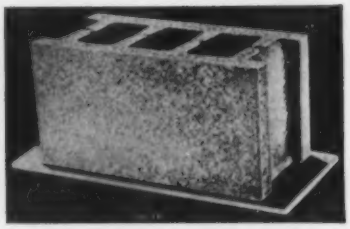
Besser Multi-Mold Hand Operated Plain Pallet Stripper—Daily Capacity 250 to 350

Besser Automatic Vibrapac Plain Pallet Stripper—Daily Capacity 4000 to 5000

Besser Power Operated Vibrapac Plain Pallet Stripper—Daily Capacity 2000 to 2500

Besser-Flam Plain Pallet Vibrator—Daily Capacity 800

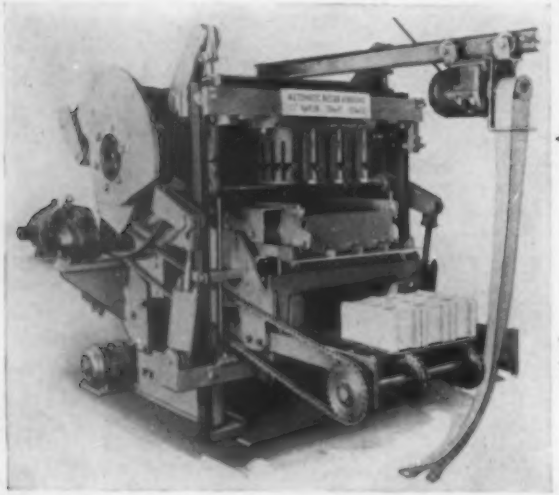
FULLY PRESSED TOP



Beauty That Stands Out
Quality That Stands Up
Made Only on

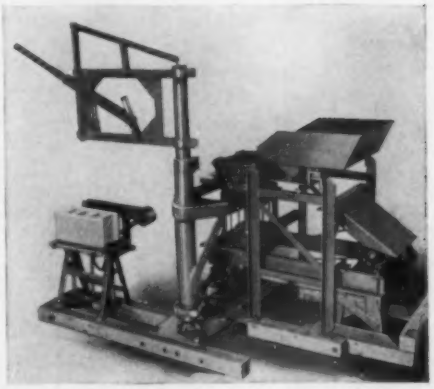
BESSER
PLAIN PALLET STRIPPERS

All Sizes and Types of Units
Made on One Set of
Plain Pallets



BESSER VIBRAPAC
PLAIN PALLET STRIPPERS

BESSER-FLAM VIBRATOR



BESSER MANUFACTURING CO.

COMPLETE EQUIPMENT FOR CONCRETE PRODUCTS PLANTS

Complete Sales and Service on BESSER, ANCHOR, CONSOLIDATED, IDEAL, HOBBS, UNIVERSAL

203 39TH STREET ALPENA, MICHIGAN

THE SAVING IN PALLET COST PAYS FOR A BESSER PLAIN PALLET STRIPPER

Concrete House Market Grows With New Products

Concrete Industries Conventions Break Attendance Records

Harve E. Kilmer, Des Moines, Iowa, new president, N.C.M.A.

Concrete products manufacturers who attended the annual convention of the National Concrete Masonry Association held in Chicago February 7-9 should certainly be able to bolster their individual businesses if they will only use to advantage information derived from the most comprehensive program yet held. The Concrete Industries Exposition was an education in itself and, judging from the interest shown, manufacturers of concrete products were anxious to learn how to make more and better quality units.

Attendance Record Broken

The success of the convention as an annual event is evidenced by the attendance, which has grown steadily with each year, and by the number of repeaters from all parts of the United States. Attendance for the convention, including the American Concrete Contractors Association, the Cast Stone Institute and the National Cinder Concrete Products Association, all held simultaneously, exceeded 2500.

Aside from the special programs for the N. C. M. A. and the concrete products machinery display, special informal meetings were held for groups manufacturing units from various types of lightweight aggregate, where problems peculiar to these units were considered, and the latest in ready-mixed concrete truck mixers and equipment for contractors were displayed.

New Officers

Harve E. Kilmer, Iowa Concrete Crib and Silo Co., Des Moines, Iowa, was elected president of the National Concrete Masonry Association. Vice-presidents elected were Roy V. McCandless, Cinder Block, Inc., Detroit, Mich.; John L. Strandberg, Concrete Building Units Co., Kansas City, Mo.; and Walter J. Mannhardt, Best Block Co., Milwaukee, Wis. Roy L. Peck, Western Brick Co., Chicago, Ill., was elected secretary-treasurer, and E. W. Dienhart, Jr., was reëlected assistant secretary.

George H. Krier, Nailable Cinder Block Corp., Brooklyn, N. Y., the retiring president, was elected chairman of the board of directors. Elected to the board of directors, in addition to the officers were: M. W. Ferguson, Cinder Block, Inc., of Roanoke, Roanoke, Va.; Harry H. Longenecker, National Building Units Co., Philadelphia, Penn.; Horace W. Bush, Multiplex Concrete Co., Inc., E. Orange, N. J.; Fred W. Reinhold, Anchor Concrete Products, Inc., Buffalo, N. Y.; and John S. Chase, Fort Worth Concrete Tile Co., Fort Worth, Texas. Ex-officio members of the board are Ben Wilk, Standard Building Products Co., Detroit, Mich., and Dan F. Servey, Haydite Corp., Kansas City, Mo.

An entire convention session was set aside for papers concerned with the development of markets for concrete homes, particularly by manufacturers of concrete products who told how advertising, demonstration homes and other types of promotion had been used to broaden markets.

B. D. Keatts, housing engineer, Portland Cement Association, led off the discussion with a paper, "What It Takes to Establish Concrete Houses in a Large City—Our Experience in the Milwaukee Market." As we all know, Milwaukee has always been a leader in promoting the use of concrete products, so Mr. Keatt's paper carried considerable interest.

He told how the markets for homes were analyzed by income groups and the ability of prospective home builders to pay for a home financed by the F. H. A. The results of the survey indicated that homes in the $4000 to $7000 classification offered the best market. The concrete house was introduced by first selling a builder on the merits of concrete home construction, followed by the building of an attractive concrete house, which was promoted through an adequate advertising campaign and pushed by a proper sales organization. A builder and architect were first interested in concrete home construction by arranging to have them go to Detroit to see what has been done in the city

At the speakers' rostrum, National Concrete Masonry Association. Left: Chas. W. Akers, Nashville, Tenn., speaking, and E. W. Dienhart, Jr., and Geo. H. Krier, seated. Center: H. H. Longenecker, Philadelphia, Penn. Right: Edward Olsen, Oshkosh, Wis.

which has led the way in concrete home construction.

As a result of these activities, a demonstration house was built in December, 1937, and was held open for public inspection until August, 1938. The builder, John D. Edwards, carried advertising in the local papers directed to the public. A total of 2½ pages were carried in the *Milwaukee Journal* and 3¾ pages in the *Milwaukee Sentinel* with some copy appearing in every Sunday issue and in special issues. Copy suggestions were taken from typical advertisements prepared by the Portland Cement Association and from other sources, the entire campaign being handled by a professional advertising man. About 60,000 people inspected the home, 37 were built, and a good prospect list is available for 1939.

Advertising Campaign to Popularize Concrete House

Charles Akers, Nashville Breeko Block Co., Nashville, Tenn., who for years has been successful in merchandising cinder concrete units for large structures, gave a talk on "Our Advertising Campaign to Popularize the Concrete House in Tennessee." Mr. Akers' talk was mainly concerned with a clever advertising booklet recently printed. The booklet, attractively bound and printed in colors, was made up to appeal to the lady of the house, on the theory that her opinions would have much to do with the selection of the type of home to be built. Mr. Akers observed that the response and interest shown to this booklet and to a newspaper advertising campaign carried simultaneously with it would result in some attractive concrete homes being built in the next few years. The publication, "To Help You Build a Home," contained illustrations of various types of attractive finished concrete homes and the cuts were selected to show the "home atmosphere" touch possible in concrete. Contained in it were figures to show savings in insurance rates, and fuel costs, etc.

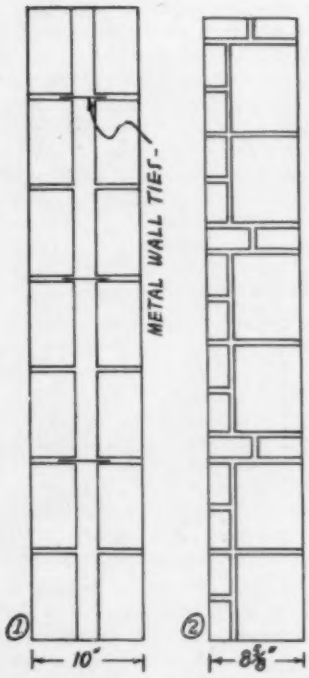
Demonstration Houses

"We Build a Demonstration Concrete House and Support it with a Merchandising Program" was the subject of an address by Ed Olsen, Badger Concrete Products Co., Oshkosh, Wis. Mr. Olsen showed how a small business concern can well afford to spread itself by a consistent and well-planned advertising campaign and develop business to justify the expenditure.

Some of your friends at the N.C.M.A. meetings. (1) B. D. Keatts, Milwaukee, Wis., left, and P. M. Woodworth, Chicago, both P.C.A. (2) F. W. Schaffer, Warner Co., Philadelphia, left; J. W. Shaver, Chicago. (3) A. H. Patterson, Baltimore, Md. (4) J. L. Strandberg, Kansas City, Mo. (5) L. B. Weatherbee, Buffalo, N. Y.

An attempt was made to get local contractors and builders to go to Milwaukee to see completed concrete houses, which was not successful, so it was decided to build a demonstration house. A good location was selected and invitations were sent to contractors for bids and all of them were invited to come around to inspect the construction after the contract was let and work had started. When construction was begun, a series of advertisements were carried in the local newspaper.

Each week during the construction period an ad was carried, telling of progress being made. The response was so effective that oftentimes work was interfered with by people inspecting the construction. Each was given some



New types of concrete masonry walls in the National Concrete Masonry Association's program of tests at the Bureau of Standards. Construction features are as follows: (1) hollow double wall with two 4-in. units and a 2-in. air space; (2) brick on edge, concrete masonry backup

literature written as a souvenir rather than as an ordinary circular.

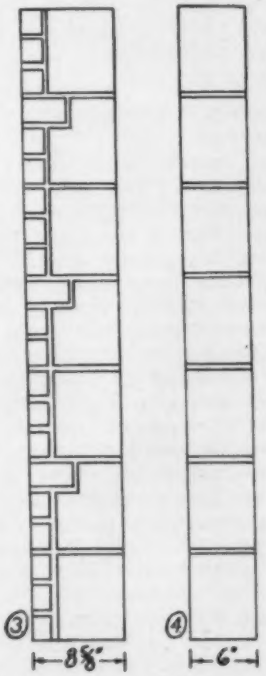
When the house was completed, advertisements announcing the opening date were run and letters were sent to the contractors in advance telling them when the house would be opened for inspection. Three pages of advertising, including tied-in advertising on the house, appeared in a 16-page newspaper. Mr. Olsen illustrated the type of advertising carried and emphasized the importance of cleverly-written copy.

On the opening day, 1300 people in-

spected the house and a total of 3500 in the next three weeks. Later the house was made available for inspection by appointment. One man was stationed in the house during the inspection period to explain features and structural details.

Promoting the Small House

N. T. Maxon, architect, Waylite Co., Chicago, Ill., in a paper "Our Plan to Provide a Concrete House Plan Service for Our Customers", discussed house designs in the $3500 to $7000 price class which are being prepared as a service to people in the lower income brackets who do not want the services of an architect. Consideration to labor costs and the shortage of really skilled crafts-



(3) split brick, concrete masonry backup; (4) 6-in. concrete masonry

men were given weight in preparing these house plans.

Selling Methods In the East

Harry H. Longenecker, Penn Building Block Co., Philadelphia, Penn., traced the development to date of the concrete house market in his territory in a paper, "The Eastern Concrete Products Association Establishes a Large Market Through Sales for Concrete House Construction." The Association was started two years ago and since that time has been very active. At least ten members find time to meet every Tuesday night to discuss industry problems and the development of enlarged markets.

In the Philadelphia area, the main market for homes is for the party wall row house type of construction. The Association early in 1938 decided to finance and build a concrete house outside the city of Philadelphia since concrete masonry was prohibited by regulation within the city limits.

A tract of land was secured and an architect, contractor and developer were secured. The house, which had a utility room but no basement, was completed in May, 1938, at a cost of $3490. The only notice given of the house was a 1-in. advertisement in the classified section of two Sunday newspapers, but 2500 people visited the house. As a result of this demonstration home, 62 houses were built and 20 more are now under construction, said Mr. Longenecker.

Then a second tract of land was selected closer to Philadelphia in a section of higher values, Fox Chase Manor, where the first house was completed on September 18, 1938. Within five weeks 43 homes were sold in this area. As a result of these projects, a number of smaller developments along similar lines have sprung up just outside Philadelphia, which were sold in groups of two to 10 houses, and since this plan was started 24 houses have been built in Harrisburg, Penn., said Mr. Longenecker. He concluded by saying that 8-in. concrete masonry for one- and two-story construction had just been granted approval by the city of Philadelphia, so it is apparent that similar developments may be anticipated within the city limits next.

New Type of Concrete Masonry Walls

Another entire session was concerned with new market possibilities and tests being conducted which will be of value in developing these markets. E. W. Dienhart, Jr., assistant secretary, N. C. M. A., discussed some tests now being conducted, in a paper "Some New Types of Concrete Masonry Walls Tested at the Bureau of Standards—Opening the Way to New Markets for Concrete Units."

He illustrated with slides tests being conducted on four types of concrete masonry wall panels which are: (1) hollow double wall construction; (2) brick on edge concrete masonry; (3) split brick concrete masonry; and (4) 6-in. concrete masonry.

Concrete products men who are convention "regulars." (1) Benjamin Wilk, Detroit, left, and Chas. Gatzke shake hands. (2) G. N. Titus, Titus Building Supply Co., Waynesboro, Va. (3) F. W. Reinhold, Buffalo, N. Y. (4) M. W. Ferguson, Roanoke, Va., left, and "Gene" Olsen, Stearns Manufacturing Co. (5) Art Sorenson, Racine, Wis., left, and H. N. Beemster, Green Bay, Wis.

Some familiar figures in the concrete products industry caught by the camera during a tour of the exhibits. (1) Marshall Soicer, Marseilles Ill., to the left and Chas. Gatzke, Des Plaines, Ill. (2) H. J. Levine, N. Y., and Dr. Lansing S. Wells, Bureau of Standards, Washington, D. C. (3) F. J. Straub, New Kensington, Penn. (4) H. L. Rogers, Price Bros. Co., Dayton, Ohio. (5) Sam Paturzo, Baltimore, Md. (6) H. H. Potts, The Celotex Corp., Chicago, Ill. (7) Bert Leitzen, Rochester, Minn. (8) B. Olney, East Chicago, Ind., left, dropped in to Rock Products' Booth.

All four types of construction have tested satisfactorily, according to Mr. Dienhart, and when the tests are completed will have the prestige of the Bureau of Standards behind them, which will be invaluable in selling units for such walls. The costs of the four types of walls under consideration are 45.75c, 41.46c, 48.25c and 30.85c per sq. ft., respectively, which includes material, ties and labor and excludes furring, plaster and painting.

Fire Tests

HUGH ROBINSON, Underwriters' Laboratories, Chicago, reviewed the various tests on concrete masonry conducted by his organization over a period of years and went into a detailed discussion of recent tests in a talk "Enlarged Opportunities for Sales of Concrete Masonry Units Opened by New Fire Retardant Classifications—Result of 1938 Series of Fire Tests."

Success in a Small Community

A. P. NELSON, Spencer Block Works, Spencer, Iowa, who has built up a very successful block business and who has been actively developing the newer markets, traced the growth of his organization in a talk, "Building a Successful Concrete Products Business in a Small Community."

Mr. Nelson made his first block in 1902, using one of the old clipper machines, and has been in the business ever since. In 1907, he purchased a face down machine, and in 1909 installed a face down stripper which had a tamper on it. In 1912, an Anchor tamper was installed and at that time the first concrete block house in Spencer was built. Part of his present plant was built in 1915, and in 1918 ten tampers were installed. Demands for concrete units taxed the plant capacity in 1920 and 1921 and 124 lumber yards were handling concrete block manufactured by the company.

Drain tile and culvert tile were added in 1926, and 93,000 drain tile were sold to one customer for the first order. One of Mr. Nelson's best selling points developed in 1931 when practically the entire town of Spencer burned down (except for the concrete construction) and about 1,000,000 concrete brick and 100,000 concrete block were sold to help rebuild the city.

Following the depression years, the company's volume of business in 1934 doubled that in 1933 and in 1935 it gained another 50 percent. In 1936, Mr. Nelson became interested in the concrete house, and in 1937 a full-time representative was engaged to call on every farmer and other prospects in his territory. This representative travels in a colorful, modern Chevrolet with appropriate advertising and, according to

Mr. Nelson, now knows every man in three counties by their first name. A second representative was engaged in 1938, and another will be started out in 1939, when Mr. Nelson anticipates doubling his output. He concluded with the statement that it is better to employ a few men to sell direct rather than to depend upon the lumber yards and building supply dealers for orders.

Large Scale Housing Projects

SAM PATURZO, V. Paturzo Bro. and Son, Baltimore, Md., followed with a paper, "Baltimore Large-Scale Housing Projects Use Concrete Masonry Units in Volume." In 1938, Mr. Paturzo's company secured the contracts for three large projects involving 550,000 cinder block mainly for fireproof partitions and for backup.

Considerable discussion pertaining to markets and the development of test data followed in the business meeting where the reports of the president and the various committees were heard. President Krier, in his presidential address, emphasized progress that had been made in the last few years.

Durability Tests

Harve Kilmer read a progress report prepared by Kurt F. Wendt, assistant professor of mechanical engineering, University of Wisconsin, on the durability tests now being conducted at the University of Wisconsin to determine comparative test data on vibrated and tamped block made from various aggregates. The tests are being conducted through the coöperation of the National Concrete Masonry Association, manufacturers of vibrating and tamping equipment and producers of various aggregates, with the intention of developing informative data which will be of value in determining the choice of methods and types of materials.

The tests, which are as yet incomplete, will determine the relative efficiency of tamping versus vibration on the strength, durability and volume constancy of concrete units from identical mixes; the effect of yield in terms of block per sack of portland cement on the durability and strength; and the relationship to density and absorption. It is hoped that the tests when completed will develop information to predict trends in manufacturing methods and to point the way for future studies.

Slides were shown to illustrate the types of equipment used and some of the testing procedure. Aggregates used to date in manufacturing the units are Waylite, Haydite, cinders, limestone, Pottsco, Superock and sand and gravel. Mixes were designed to produce yields of 17, 25 and 33 8- x 8- x 16-in., three-core block per sack of portland cement

Snap Shots taken in the exhibit hall. (1) Geo. J. Root, Elmira, N. Y., standing alongside new Kent block machine. (2) C. G. Cates, Roanoke, Va., getting down to business. (3) Art Sorenson, Racine, Wis., left, and H. C. Shields, Marquette Cement Manufacturing Co., Chicago to the right. (4) C. D. Whiteman, Waco Sand and Gravel Co., Tyler, Texas, to the left. (5) J. J. Buzzell, of the Besser Manufacturing Co., right. (6) Ross Head, Hamilton, Ont., left, and Stephen Flam, Sherman Oaks, Calif. (7) L. A. Chick, Blairsville, Penn., facing camera. (8) Ralph W. Mead, secretary, National Concrete Burial Vault Association

RECORD-BREAKING YEAR AGAIN PROVES....

Home buyers want CONCRETE

Will they get concrete? *Who* will be the Builder? AGAIN IT'S *UP TO YOU*

IN 1938 concrete home construction once more broke all records—with *3 times* as big a share of the residence market as in 1935.

In 1939 Portland Cement Association national advertising will again go into the best homes in your community and direct house prospects to *YOU.*

Can they find you?

Yes, if you build demonstration homes.

Yes, if you advertise in phone books, newspapers, by mail or radio.

Yes, if you display truck and job signs.

Yes, if you have live-wire salesmen to follow up leads.

Concrete contractors, concrete masonry manufacturers, builders and realtors who feature concrete houses will enjoy a steady, growing volume of business.

PORTLAND CEMENT ASSOCIATION

Dept. A3-45, 33 W. Grand Ave., Chicago, Ill.

A National Organization to Improve and Extend the Uses of Concrete

START A NEW BUSINESS

This shows one of our Multiple Molds for casting 8x8x16" concrete blocks. We manufacture a complete line of Multiple Molds for blocks (both Rockface and plain), for brick, veneer blocks, etc. We are also owner and originator of the ZAGELMEYER SYSTEM of granite veneer for blocks.

Make ZAGELMEYER *Waterproof Concrete Blocks*

No Other System Produces a Block Equal to This!

A Start May Be Made With as Little as $500.00

The Zagelmeyer System of casting cement blocks in multiple molds produces a block that no other system can equal. Competition is eliminated. No better granite-face, water-proof block is made. This is your opportunity for good profits. Many good territories open. Write today for further information.

Zagelmeyer Cast Stone Block Machinery Co.

602 S. HENRY ST. BAY CITY, MICH.

COMMERCIAL'S *New Catalog*

"JUST OFF THE PRESS"

WRITE FOR IT

The COMMERCIAL SHEARING & STAMPING COMPANY
YOUNGSTOWN, OHIO.

and the cement used was a blend of four standard brands.

Vibrated units were manufactured on a Stearns Joltcrete vibrating machine in the plant of the Mid-West Concrete Pipe Co., Franklin Park, Ill., and tamped block were made on a Besser machine at the plant of the Best Block Co., Milwaukee, Wis. Mixing was done for a period of five minutes in a blade-type mixer in 45-block batches and curing was done under controlled conditions. Some of the units were sent to the Portland Cement Association laboratory for 7-day compression and volume change tests and others to the University of Wisconsin for 28-day compression tests and for tests on absorption and density.

Results so far have disclosed only minor differences in vibrated and tamped units from the same mixes. Considering all the types of aggregates used and all the mix ratios, vibrated units have shown higher early strengths on an average. At seven days, the vibrated block have tested six percent higher than the tamped block and at 28 days the tamped block have been four percent higher in strength. The vibrated units have absorbed slightly less water and are on the average four percent lighter in weight. Of course there have been some variations from these averages for certain individual aggregates and mixes, and in some cases comparative figures have actually shown the reverse.

Freezing and Thawing Tests

The procedure for conducting freezing and thawing tests was described in some detail. The method consists of soaking the units in water and placing them face down in ¾ in. of water. Then the unit is placed into a freezer and subjected to a temperature of —10 deg. F. After freezing to this temperature the unit is thawed and the cycle will eventually be repeated at least 100 times. So far 60 cycles had been completed. Normally units stocked in the open at Madison will be subject to 24 cycles of freezing and thawing, according to official weather reports, but the tests being run are about the average in severity of similar tests being conducted in laboratories throughout the country.

Incomplete results, illustrated by slides, showed disintegration to have taken place at 15 cycles for units made from the leanest mix and unlike aggregates behaved differently. Failure was evidenced first by the cracking off of the ¾-in. face shell in whole or in part followed by progressive disintegration further into the unit.

The report concluded with the precaution that merchandising for greater profit through increased yield at the expense of quality will in the end prove costly to the manufacturer.

Symposium On Concrete Floors

At a joint meeting of the National Concrete Masonry Association and the American Concrete Contractors Association, a symposium on concrete floors of various joist and slab constructions was held by manufacturers who have been specializing in these units on a large scale.

Walter A. Sherman, secretary, Milwaukee Concrete Products Association, Milwaukee, Wis., discussed the advantages of concrete floors in his paper, "Concrete Tile and Joist Floors Prove Economical in the Milwaukee Area."

He discussed the adaptability of concrete joists and concrete filler tile for light and medium loadings, the favorable sound and heat insulation properties of such floors, low upkeep, reduced form costs and labor costs in installing them, etc. Slides were displayed showing tables of floor specifications, costs, etc., for various loadings which are used

C. Van Houten, Chicago, standing at banquet

in the Milwaukee area and suggested that such data, if it appeared in engineering handbooks would be of immeasurable value in selling this construction.

Special Floor Tiles

Charles Akers, Nashville Breeko Block and Tile Co., Nashville, Tenn., described the design and pointed out the advantages of the familiar Breeko floor tile, using slides for illustrations, in a paper, "The Breeko Tile and Joist Floor—Typical Installations in the South, East and Central Sections of the United States." The Breeko tile is a cinder concrete unit which has incorporated into its design a raised rib, or lug, which provides a levelling guide for strike-off purposes in placing the concrete slab and is the nailing base for placing the top floor finish. The company also manufactures the patented "Breeko" block, a 12- x 24-in. partition cinder unit, both of which have been used extensively in large structures in Nashville. They are now being introduced in the East.

A. P. Nelson, Spencer, Iowa, left, and "Spec" Collins, right

Harold B. Hemb, Gorey and Hemb, contractors, Evanston, Ill., discussed details in setting and handling precast concrete joists on the job, and his paper was followed by a talk by J. W. Warren, Southern Cast Stone Co., Knoxville, Tenn., on "Precast Concrete Joist and Precast Concrete Slab Floors as We Build Them in Knoxville." One of the first precast slabs on joists jobs furnished by Mr. Warren was for construction of 200 houses at Norristown, Tenn., by T.V.A. Thin precast slabs were used in most of these houses, but 20 of them had precast cinder slabs to which flooring was nailed direct. Moving pictures were shown to illustrate some of the jobs furnished.

Joists and Filler Block

Another interesting concrete floor, consisting of precast joists and concrete filler block, was described and the development of the market for these units was reviewed by C. Everett Burbank, Bedford Hills Concrete Products Co., Bedford Hills, N. Y., in his paper, "Precast Concrete Joist Floors with Precast Concrete Filler Units. Record of 'Floroform' Floors in New York and Connecticut."

The "Floroform" floor consists of precast joists and precast filler blocks with the filler blocks bearing on the inverted T of the concrete joists, with concrete poured between the joints on the job and to a given level above the tops of the joists. The manufacture of these units was described in full in Rock Products, April, 1937, pp. 89-93.

Joists are cast in 6-, 8- and 10-in. depths and the mix, with high early strength cement, develops strengths of 3000 p.s.i. in 48 hr. and 4000 p.s.i. in 7 days. The joists are placed in paper-lined molds by slow speed vibration and are made at the rate of 40 8-in. joists in 8 hr.

Filler block are made from a leaner mix and are manufactured in four sizes. A complete setting drawing is furnished for each job, and an engineer is

Herb. J. Vincent, Detroit, Mich., left, and G. H. Krier

always placed on the first job. Sizes are such that no cutting of either filler blocks or joists is necessary. Joists extend below the filler units from 3 to 6 in. to give a pleasing beam-ceiling effect.

The floor system was adopted back in 1932 as the result of a need for insulation and the elimination of forms. In 1933 three jobs were sold which were followed by 74 jobs involving 3767 lineal feet of joists in 1934. The growth in volume of sales was continuous, and in 1938, 101 jobs were sold, involving 34,616 ft. of joists and 26,000 filler blocks. About 70 percent of the volume of sales to date has been for residences, with the balance for porches, roofs, libraries, barns, churches, garages, etc. To date the units have been merchandised in four states, on jobs ranging from $2000 to $200,000, and at times units have been trucked as far as 150 miles. Mr. Burbank concluded by stating that a new plant was being built this year to double the capacity for these products.

F. J. Straub, New Kensington, Penn., in offering his observations of 20 years' progress in the concrete masonry industry, advocated the use of covered storage for concrete block and said there was a need for preventing segregation in bins in order to manufacture a unit of constant quality and weight.

Use of Calcium Chloride

H. F. Clemmer, engineer of materials, District of Columbia, Washington, D. C., had a paper, "The Practical Application of the Use of Calcium Chloride in the Manufacture of Concrete Masonry Units" in which he discussed the benefits of using this material for developing high early strengths and emphasized the increasing demands for early strength concrete. Acceleration of the chemical reaction taking place in fresh concrete and the facilitation of the curing process were mentioned as the main advantages. He also claimed that calcium chloride, when properly used, densifies concrete, lowers its absorption and increases workability. Data on the needed percentages of calcium chloride to develop high early strengths were given and the reaction of calcium chloride with the tricalcium silicate in cement was discussed. Mr. Clemmer said that in order to gain strength rapidly some engineers have advocated that concrete should be placed during periods of rising temperatures, to emphasize the degree of importance placed on early strengths. In Washington, D. C., concrete is not poured after two o'clock in the afternoon for example.

New plants for the manufacture of concrete masonry units were discussed by concrete products manufacturers operating three distinct types of plants, with particular emphasis on plant layout, raw material handling and storage, molding machines and the handling of finished products.

Three Types of Plants

Ernest Spickelmier, Spickelmier Fuel and Supply Co., Indianapolis, Ind., who operates two Stearns Joltcrete vibrating machines, described his operating procedure in some detail. Briefly, his storage system consists of five 16-ft. diameter by 90-ft. silos for the storage of sand, gravel, two sizes of Haydite aggregate and bulk cement. Materials are drawn from storage through side discharge gates and are proportioned and mixed on the floor directly over the block machinery, requiring no elevation. About 7000 units are manufactured daily, all of which are handled into the curing kilns by a Clark gasoline lift truck.

C. B. Fellabaum, National Cement Products Co., Toledo, Ohio, operating a Besser-equipped plant, gave some general observations on efficient plant layout and practice, illustrated with slides. He said that any plant should be located, first of all, in order to take advantage of low freight rates on materials. Cars and trucks should be unloaded without interruption and machinery should be kept in continuous operation as the most efficient method of operation, said Mr. Fellabaum, particularly in view of the current wage and hour laws and the trend toward shorter hours.

The efficient plant, in his opinion, should be arranged so that a number of sizes and types of units may be manufactured simultaneously. Added machinery for that purpose, and for manufacturing lintels, sills, etc., are an investment that will pay out, according to Mr. Fellabaum. He said that the curing rooms should be located as close as possible to the block machinery and emphasized the importance to have adequate kiln capacity and storage space to take care of the rush seasons.

Mr. Fellabaum advocates the use of covered yard storage, and at his plant has 13,000 sq. ft. of such storage, to which he can point with pride to visiting architects and contractors. He uses an electric hammer at his plant in the manufacture of precast concrete lintels.

P. J. Rega, Mt. Pleasant, Penn., operating a Multiplex-equipped plant, cautioned against using too little cement in concrete block and discussed his experiences in operation and in customer contacts. The meeting concluded with considerable discussion from the floor on operating details and problems. Other speakers in joint meetings discussed subjects of general wide-spread interest to delegates of all the conventions.

On the stage at the annual Concrete Industries banquet. Left to right: Geo. H. Krier and Dan Servey, past presidents of N.C.M.A., and Harve Kilmer, new president, leading the singing

Stress Quality Standards at Cast Stone Convention

M. A. Arnold, Greensboro, N. C., new president, Cast Stone Institute

Manufacturing developments, promotional ideas to sell cast stone as a quality product, new markets, and the results of highly important laboratory studies were the principal topics discussed at the annual convention of the Cast Stone Institute, held February 6 and 7 in conjunction with the meetings of other concrete products groups.

The meeting opened with the reading of the secretary's report by C. G. Walker which showed gains in membership and in influence. Mr. Walker stressed the need for standards upon which to base quality and said that samples of cast stone were revealing far too much variance in quality. He mentioned the testing service now effective in Washington, D. C., which is a means of checking on the quality of cast stone and in providing data of real value in promoting the sale of cast stone to architects. In reporting upon activities of the Institute, Mr. Walker told about the progress in research on the properties of elastic painting compounds and on integral and surface waterproofing compounds.

R. E. Copeland, of the development department, Portland Cement Association, explained the significance of studies which have been made on "Exposed Aggregate Finishes on Cast-in-Place Concrete." For several years, the Portland Cement Association has been conducting these studies and experimenting, under Mr. Copeland's direction, on methods of applying special aggregate finishes integrally with poured concrete.

Reinforcing Cast Stone

Otto Buehner, Salt Lake City, Utah, pinch-hitter for E. E. Rackle, chairman for the evening session on February 6, introduced F. R. McMillan, director of research, Portland Cement Association, who had for his subject the "Theory and Practice in the Use of Reinforcing in Cast Stone." Slides were shown by Mr. McMillan to show the results of laboratory tests on various sections of cast stone. In response to a questionnaire sent out by C. G. Walker of the Portland Cement Association, ten replied that they used reinforcing regularly, 10 use it only because they felt there should be reinforcement, and others use it only when specified.

Mr. McMillan said that there were only two reasons why reinforcing should be employed: (1) As an aid in handling; (2) to increase strength and life of unit in the structure. Reinforcement must not result in disfigurement of the structure. Spalling of cast stone due to rusting of steel reinforcement is a problem as small cracks invisible to the eye will cause water to penetrate to the reinforcing steel. The placing of reinforcement is important, and lintels and other members bearing loads should have adequate reinforcement which should be amply covered by concrete. Tests indicated that it was not advisable to use reinforcing steel in cast stone units laid up ashlar which are subjected only to compression and shear.

Observations in European Countries

M. A. Arnold, Greensboro, N. C., told about his observations of cast stone manufacture in Germany, England and Holland. In Germany, he found that the concrete products industry was controlled by a central bureau in Berlin. Practically no cast stone is made in Germany today, but there is a great deal of activity in concrete masonry units. A great many things made of iron are being replaced with concrete products. Large quantities of concrete walk tiles are made by the vibration process, and there are practically no monolithic concrete walks laid in Germany. The reason for this is that all the utilities are laid beneath the walks instead of the streets, and it is much easier to make repairs if concrete tiles are used. A comparatively wet mix is used and the best grades of tile are ground almost like terrazo.

A tremendous business is done in cinder and light-weight aggregate concrete units. So-called duo-concrete bricks are made, using a peculiar gray soil as aggregate. An admixture made from a secret formula is used with the concrete mix to retain moisture, eliminating the need for moist curing. These units are made near the Rhine and are shipped all the way to Berlin. They are lighter than our lightweight units and are very strong to conform with the rigid specifications of the government.

In England, Mr. Arnold said that he had a very cordial reception from Mr. Winchester, secretary of the Cast Stone Institute of that country. England has been very active in cast stone work, but very little compares with the work in this country. The entire exterior of the Dorchester Hotel is faced with cast stone that looked like terra cotta from a distance. On closer examination, however, it was found that the glossy finish was created by finishing with two coats of valspar varnish. Evidently "crazing" was due to too much fines.

Sales at a Profit

Chairman M. A. Arnold introduced W. D. M. Allan, director of promotion, Portland Cement Association, at the morning session on February 7. Before launching into his talk, Mr. Allan told about the difficulties of organizing the cast stone producers and paid a tribute to the efforts of "Gil" Walker in behalf of cast stone.

Four essentials were outlined by Mr. Allan to make a profit in the cast stone industry: 1. An expanding market; 2. Quality; 3. Fair Price; and 4. Effective selling. Poor quality of some cast stone products, he said, had caused architects to shy away from the use of cast stone.

What Sells the Architect

C. C. Bennett, district manager, Sweet's Catalog division, F. W. Dodge Corp., said that in selling architects it is well to remember that 20 percent of the architects are new every year and that 75 percent of the dollar volume of the building business is controlled by the architects. Architects are no different than others as far as sales approach is concerned. The architect must know for each product the design, the mechanics—how it fits into the job, and the economics of cost. Mr. Bennett stressed the fact that markets are not static, but are a continuous parade and new architects and contractors must be sold as the years go by.

Developments in Mosaic Cast Stone

C. G. Walker of the P.C.A. displayed some interesting colored slides showing examples of fine mosaic cast stone to demonstrate the possibilities in capturing markets involving large structures. A slide showing cast stone used in an old church in the East demonstrated the durability of good quality products. L. A. Falco of Dextone Co., New Haven, Conn., sent a message to the meeting emphasizing the value of promoting the sale of mosaic cast stone. Mr. Walker said that he is going to prepare a list of manufacturers who are ready and willing to maintain high standards of quality, and asked the coöperation of the association.

C. G. WALKER opened the discussion of the problem of opening mortar joints with its attendant discoloration and leakage. He gave the qualifications of a good joint sealing compound, stating that it must be elastic and adhesive but must not collect dirt. Austin Crabbs, Davenport, Iowa, said that he had used an elastic compound in coping and had primed all work. Mr. Arnold said that the leaking joint problem is new and can be traced to the modernistic type of architecture with set-backs. Water gets into the cracks in the coping because a good mortar job is not done in the brick back up. In Holland, he said, the architects are using horizontal lines permitting projections of coping which protects the work below. Mr. Frauenfelder said that they had found it necessary to apply the elastic compound themselves, coating all joints with a sealing compound.

Opportunities for Cast Stone

GEORGE SAFFERT, American Art Stone Co., New Ulm, Minn., gave a very inspiring talk about his sales and production methods. Mr. Saffert was very emphatic in his remarks about the necessity of maintaining high quality standards to meet competition with other units. He said that the introduction of colored cast stone faced units had helped very materially to reduce sales resistance, especially for interior use. Mr. Saffert described how he uses a 3½-in. roller which is moved across the soft concrete units to remove uneven surface and to reduce culls. Two facing roller machines face five units at a time after they have come from the curing room. A portable roller sander is employed for special sizes. He urged producers to go after the markets in the higher class brackets and not to attempt to get business merely by under-selling.

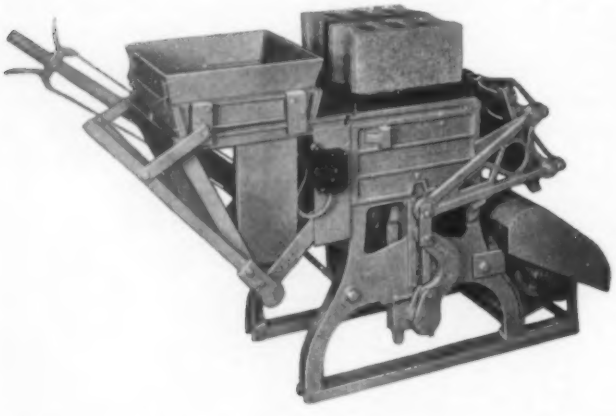
A lively discussion followed which was led by Mr. Edmonds, Washington, D. C., manufacturer of lintels, coping, pier caps, etc., who told how he had increased the strength of his units from 3500 to 7000 p.s.i. and reduced water absorption from 15 to 4 percent. He uses an air hammer for vibrating and low pressure steam curing. Units are later removed to a shed for eight days' curing. Mr. Harter of Oklahoma City said they had kept a large stock of sills, lintels, key stones, etc. Mr. Elkin reported that his company makes flag stones with excess concrete found in the mixer after a day's run. Frank Krebiel told about his experience with ½-in. slabs for veneering in place of glass in remodeling store fronts. Considerable discussion evolved around various methods of curing by placing a coating around the units, such as parafin and asphalt. The Nucarth Brick & Stone Co., Carthage, Mo., has practically eliminated "crazing" by use of high pressure steam curing at 120 deg. F.

New Officers

M. A. Arnold, president of the Arnold Stone Co., Greensboro, N. C., was elected president, and A. R. Krehbiel, Trusswall Stone Co., Kansas City, was made vice-president. Mr. Formigli will continue as secretary and treasurer. The new directors are George Saffert, president, American Art Stone Co., New Ulm, Minn.; and Otto Buehner, Otto Buehner & Co., Salt Lake City, Utah.

MULTIPLEX VARIABLE SPEED VIBRATORS

set up a new standard for production and low cost units



This sturdy machine is equipped with a variable-speed vibrator and assures you the same standard true units as before. It is the only machine equipped with variable-speed vibration.

Increased production is assured, together with better texture.

Vibrate your units under the proper speed with a Multiplex machine. They are made in hand or power units, with a production ranging from two to six units per minute.

Write for full details.

Tampers — Presses — Vibrators — Mixers — Complete plant installations—Etc.

THE MULTIPLEX CONCRETE MACHINERY CO. ELMORE, OHIO

Solving Cold Weather Problem With Ready-Mixed Concrete

(Continued from page 38)

enced over a period of pours in cold weather than in the summer months when there are rains and different shipments of material vary in moisture content.

R. E. Robb, Scientific Concrete Service Corp., Washington, D. C., discussed the variations in moisture content at the plants of the Koenig Coal and Supply Co., Detroit, where detailed records are being kept on all batches. Out of 926 determinations for every batch a compensation for moisture change was needed 420 times. At this plant operations are conducted on a 0.25 percent variation which, according to Mr. Robb, corresponds to a change of 75 to 100 p.s.i. in the strength of the concrete. He contends that every batch must be checked in order to hold the concrete at a definite quality.

Irving Warner, Warner Co., Philadelphia, Penn., in reply to a question, said that for the average ready-mixed concrete plant 1¼ boiler horsepower for each cu. yd. of concrete per hour is required for heating aggregates.

Stanton Walker quoted a prominent concrete engineer's opinion regarding the proper temperatures of the mixing water, which conflicted with the previous discussion. In this engineer's opinion, with the finely ground cements now in use, there is danger of injury from too much heat, and test data indicate that temperatures much in excess of 100 deg. F. result in lowered quality of the concrete. He recommended that if the water and cement come in contact immediately at the higher temperature, the water should not be heated to more than 110 deg. F. On the other hand, if the operations are so controlled that the water first comes in contact with the cold aggregates the problem is changed.

Mr. Thomson called attention to the fact that a highway department in the Middle West limits the temperatures of all material to 120 deg. F. With water limited to 120 deg. F. an extra burden is imposed on the heating of aggregates in extremely cold weather.

Mr. Young said that field tests in Canada have indicated that winter concrete is better than that placed in the summer, and that it is customary for the Hydro-Electric Power Commission to place the greater part of the concrete during cold weather. His company allows for a loss of 5 deg. in the temperature of the concrete between the plant and the job.

Stanton Walker led the discussion on the "Effect of Length of Haul and Time of Mixing" by stating that the finer grinding of cements and operation under a wider range of conditions than ever before have brought complicating problems. Mr. Walker referred to early investigations by S. C. Hollister which established mixing periods of from 40 revolutions of the drum to one and one-half hours, and suggested that there be a reëxamination of the subject in the light of more recent experience in order to arrive at a basis for modification of present limits where special circumstances apply.

Several incidents were mentioned by producers where concrete was placed a long time after prescribed limits for time and gave satisfactory service, illustrating the ability of concrete to stand abuse.

Harry C. Shields, Marquette Cement Manufacturing Co., Chicago, mentioned some of the physical factors which may contribute to shrinkage and subsequent cracking, in a discussion of the possible effects of different brands of cement on shrinkage. By replacing water lost through evaporation from concrete placed with a hot wind blowing, surface cracks were eliminated entirely in a stretch of pavement where cracks were attributed to the use of too hot cement, said Mr. Shields.

Stanton Walker observed that up to certain limits the longer the concrete is held between the time of mixing and putting it in the forms the better it is due to the reduction of shrinkage during the interval.

O. P. Steele, Pacific Coast Aggregates, Ltd., San Francisco, Calif., said that state specifications for hauling time in his area have been raised to 45 minutes and that tests are being conducted along the line that various cements and the number of revolutions of the mixer are to be considered rather than the time elapsed after the addition of water and cement.

Methods of Handling

H. F. Thomson, St. Louis, leading the discussion of "Methods of Handling Ready-Mixed Concrete from Trucks to Forms", illustrated his remarks with a number of slides to demonstrate conditions under which ready-mixed concrete may and is being delivered and placed. Mr. Thomson suggested that the ready-mixed concrete operator can help himself as well as the contractor by servicing the job in advance to a certain extent through contacting the contractor and making a mutual plan for the rate of delivery and methods of rehandling. Such preliminary planning, according to Mr. Thomson, will enable the utilization of one of the real merits of ready-mixed concrete, which is the economy of delivering concrete on wheels as near as possible to the final point of deposit.

He cautioned against offering too much equipment service to the contractor and said that ready-mixed concrete is a building material which should, in as far as possible, be delivered at the spout of the mixer to avoid complications.

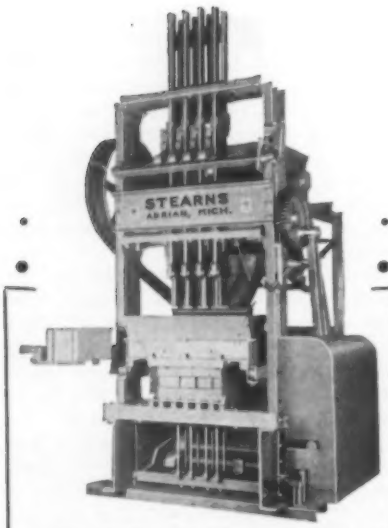
James Kolinski, Central Ready Mixed Concrete, Milwaukee, at Chairman Foster's request, told of experiences in placing ready-mixed concrete by the Pumpcrete machine, a pump for handling plastic concrete. He has found the Pumpcrete of advantage on jobs hard to get close to and in cases where a number of setups would be needed in handling the job. One of the main advantages, said Mr. Kolinski, is that concrete is immediately discharged into a hopper and the idle time of the trucks is reduced to a minimum.

Deliveries are being made with the machine as far as 1800 ft. with a lift as high as 128 ft., and the concrete is of about the same consistency as it would be when delivered directly from a truck. His operating experience was based on handling over 60,000 cu. yd. of concrete by the Pumpcrete, and a rental charge of 50c per cu. yd., including the operators, was charged. The main saving by pumping was on time saved in operation of the trucks.

Edmund A. Lockett, E. Lockett and Son, Pasadena, Calif., asked if it was advisable for producers of ready-mixed concrete to go beyond the point of delivery of the concrete and concern themselves with how the contractor handles the concrete, and whether he is doing it properly. Chairman Foster suggested as a possible precaution against the abuse of the concrete by the contractor that independent inspection might some day be authorized by engineers and city authorities to limit the use of concrete to certain well-established methods that have been approved.

H. F. G. Pelsue, Graham Bros., Inc., Los Angeles, Calif., led the discussion of "Purchase Specifications for Ready Mixed Concrete". Mr. Pelsue implied that lack of confidence by engineers in ready-mixed concrete producers was one of the reasons for too rigid specifications, and said that the industry as a whole should work toward building that confidence.

Sanford Thompson, in discussing accurate pouring of concrete, suggested



"ANCHOR"

Complete equipment for making concrete, cinder and other light weight aggregate units, including engineering service for plants and revamping of old ones for more economical service. Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers, Stearns mixers, pallets, Straublox Oscillating attachments, etc. Repair parts for Anchor, Ideal, Universal, Stearns, Blystone mixers and others.

Anchor Concrete Mchy. Co.
G. M. Friel, Mgr. Columbus, O.

Concrete Pipe Equipment

UNIVERSAL offers you a complete line of concrete pipe machinery for making every size from 6" to 48" both bell-end and tongue and groove. Every part is designed for a lifetime of trouble-free service.

Send for catalog

UNIVERSAL CONCRETE PIPE CO.
INCORPORATED
COLUMBUS, OHIO

more and more automatic control as the coming trend. He discussed the construction of several dams where automatic control is used and a plant near London, England, where locking devices are used and where automatic control was exercised over moisture contained in the sand.

Ready-Mixed Concrete Merchandising

H. F. THOMSON, St. Louis, Mo., presided over a meeting of the National Ready Mixed Concrete Association wherein were held open discussions on merchandising problems and the development of enlarged markets for ready-mixed concrete.

H. F. G. PELSUE, Los Angeles, Calif., led the discussion on merchandising, touching on prices, actual sales effort and customer services. In Los Angeles, Mr. Pelsue said that ready-mixed concrete is sold at a standard list zone price on jobs of up to about 50 or 100 cu. yd., with an average zone area of only two miles square. For larger jobs of over 400 or 500 cu. yd. the ready-mixed concrete business becomes more of a subcontracting function in his area. He emphasized that one experienced man in an organization the size of his, with 17 trucks, should make the estimates in order to guard against discrimination, etc., to the contractor.

Mr. Pelsue cautioned against allowing the use of customer services, such as receiving hoppers, to develop so rapidly that no profit is gotten from them.

He said that the industry is overlooking the need for proper training of salesmen to sell ready-mixed concrete and suggested that the Association consider the preparation of a sales manual for the use of the salesmen, to include certain technical and other information on placing and handling concrete to equip them for a better job of selling. The convention unanimously approved Mr. Pelsue's suggestion and agreed to place the matter before the board of directors for consideration.

Considerable time at the meeting was taken up in a discussion of how prices for ready-mixed concrete are established.

Another large producer, in the East, bases his prices on the cost of dry materials to the contractor. The list price is that established for 3- to 500-cu. yd. orders. A discount of 40c per cu. yd. is granted in the range from 500 to 2000 cu. yd., another discount of 40c is given for orders exceeding 2000 cu. yd. and an additional discount of 25c is allowed for orders exceeding 5000 cu. yd. The base prices are computed by adding $1.08 per cu. yd. to the cost of sand, cement and coarse aggregate to the contractor and a premium of $1.75 for less than 3 cu. yd.

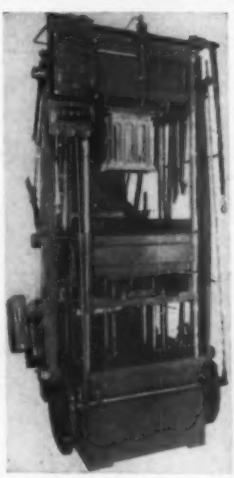
Another producer bases his prices taking into consideration the yardage involved and the prevailing wage rate. The price is arrived at by adding the price of the gravel and sand f. o. b. the bin to the price of cement at his warehouse or bin for each cu. yd. of concrete. Then a charge of $1.15 per cu. yd. for the first mile of haul is added, with an added charge of 15c per cu. yd. for each additional mile and the maximum spread of $1.25 and a minimum gross margin of $1.00 are added. The figures are based on 50c labor with the spread of $1.25 decreasing for quantities over 100 cu. yd.

CEMENT COLORS

RICKETSON'S
CEMENT COLORS
Since 1885
15 Standard Shades
"You can't Fade 'Em"
Write for samples & technical information
Ricketson Mineral Color Works
MILWAUKEE WISCONSIN

STAR and ANCHOR COLORS
Geo. S. Mepham Corp., East St. Louis, Ill.
C. K. Williams and Co., Easton, Penn.

The
KENT-ROOT VIBRA-PRESS



IT VIBRATES: Controlled impulses isolated from the machine give intense vibration in mold box where it is required.

IT PRESSES: Forms every block the same height, gives perfect corners, flat tops and bottoms and even texture.

Write for descriptive circular

THE KENT MACHINE COMPANY
Cuyahoga Falls, Ohio

Ready Mixed Concrete Markets

R. C. COLLINS, Warner Co., Philadelphia, reviewed briefly some of the markets the Warner Co. is serving with ready-mixed concrete and led the discussion on how new markets are developed and the types of promotion and advertising employed with success. While the Warner Co. is a very large producer of ready-mixed concrete, Mr. Collins pointed out how important small orders of concrete had proved to be. In 1937, 17 percent of the total volume of concrete sold was on miscellaneous jobs of 100 cu. yd. and over, and 18 percent was for similar jobs of less than 100 cu. yd. In 1938, these figures increased to 21 percent and 22 percent respectively.

In order to expand the markets for ready-mixed concrete, Mr. Collins suggested that a concentrated effort be made to develop more business in the market now being operated rather than to attempt to expand geographically. As an example of what can be done, he gave the experience of the Warner Co. in attempting to develop a market in house foundations, where concrete had not been used up until three years ago. Home foundations had for years been constructed of stone obtained locally in Philadelphia.

Another market developed by progressive effort of the Warner Co. was in connection with house developments outside the city proper. The streets in these developments had always been brick top with a macadam base. The company succeeded in having some of the townships permit a 5-in. base where an 8-in. macadam had been specified, and a contractor was sold on the possible savings with the result that this contractor used about 5000 cu. yd. of ready-mixed concrete for that type of work in 1938. For this work a 1:3:6, low-slump concrete is used, far exceeding in strength the guarantee of 1000 p.s.i.

In discussing advertising, Mr. Collins advocates direct mail if the message is to be directed to the contractors. Newspaper advertising is recommended to reach the public, but Mr. Collins advocates coöperative advertising with a builder who is featuring a home in which ready-mixed concrete is used. This plan will derive for the producer the benefits of a message that has appeal and at low comparative cost. The contractor's attention should be called particularly to the facility, convenience and savings which will accrue to him by using ready-mixed concrete.

C. P. MALONEY, Maloney Concrete Co., Washington, D. C., said that his company had delivered to over 100 speculative jobs in one day, ranging from ½ cu. yd. to 200 cu. yd. each, emphasizing the importance of this type of job. As to advertising, he said that his concern gets best results by keeping a neat truck on the street, etc. Newspaper advertising and direct mail had not been successful in his particular case.

STANTON WALKER, director of engineering, in his report to the board of directors, reviewed the activities of his department in preparing specifications and standards of practice, in coöperating with other agencies in various studies and outlined needed research work.

Among the research projects which are in need of study Mr. Walker suggested the following: (1) methods for sampling ready-mixed concerete; (2) methods for investigating the efficiency of truck mixers and agitators; (3) effect of time elapsing between mixing and placing on volume changes of concrete; (4) effect of length of haul; (5) effect of size of load, rate of mixing, and time of mixing on mixing efficiency; (6) effect of temperature of aggregates and water on characteristics of concrete.

FLEXIBILITY • • • TOUGHNESS • • • DURABILITY

• • • STRENGTH • ELASTICITY • • •

Archimedes took no chances with his self-made block and tackle when he offered "To do the work of a hundred men" with it . . . because he had designed and constructed his equipment with a definite purpose . . . he had tested its ability, and consequently was sure what the results would be.

NEVER
A MATTER OF CHANCE

The quality of "HERCULES" (Red-Strand) Wire Rope begins with the fixed determination to produce a product that will be *consistently* long lasting . . . dependable . . . economical. It involves the use of acid open-hearth steel wire, correct design and manufacturing methods, long experience — all double-checked by rigid tests and exacting inspections from start to finish. The result is a wire rope that you can rely on—just as thousands of others are doing.

With wire rope, it pays to use the best, for therein is the way to increased safety, longer service and more continuous operation. You take no chance when you specify "HERCULES"—the wire rope that has proved its ability by its service record.

In order to be suitable for all purposes, "HERCULES" (Red-Strand) Wire Rope is made in a wide range of both Round Strand and Flattened Strand constructions—all of which are available in either the Standard or Preformed type. If you will tell us how you use wire rope, we shall be glad to suggest the construction and type we consider best for your conditions.

"HERCULES" (RED-STRAND) REG. U.S. PAT. OFF.
WIRE ROPE

MADE ONLY BY
A. LESCHEN & SONS ROPE CO.
WIRE ROPE MAKERS • ESTABLISHED 1857
5909 KENNERLY AVENUE • • ST. LOUIS, MO.

New York.....87 to 90 West Street
Chicago.....810 W. Washington Blvd.
Denver.....1554 Wazee Street
Portland.....814 N. W. 14th Avenue
San Francisco.....520 Fourth Street
Seattle.....3410 First Avenue South

New Machinery Shown at the Concrete Industries Show

More new machinery and products were displayed at the 1939 Concrete Industries Show at the Sherman Hotel, February 6 to 9, than for several years past. Illustrations of equipment and descriptions which follow represent apparatus of interest to concrete products men that have not been previously described. The February issue of ROCK PRODUCTS also showed new equipment that was exhibited at the recent exposition.

BESSER MANUFACTURING CO., Alpena, Mich., had five machines which were either entirely new or had been materially improved.

The Vibrajoist machine is built for 8-, 10-, and 12-in. joists, and is constructed for various lengths. It is made entirely of steel, heavily arc-welded to insure maximum strength and durability. The mold is supported on springs above the base.

An improved Besser-Flam vibrator block and brick machine has been brought out which has a production capacity of 800 standard blocks per day. In this machine, the mold is the only part that is vibrating. All-steel adjustable molds produce units from 2-in. to 8-in. high.

An entirely new machine is the automatic Vibrapac plain pallet stripper which has a capacity of 560 standard 8- x 8- x 16-in. blocks per hr., making three standard or six 4- x 8- x 16-in. blocks on one plain pallet. The machine frame is only 6½ ft. high. This machine has "undirectional vibration," incorporating the Flam patented horizontal hickory wood arms used in the Besser-Flam block machine. An electric off-bearing hoist makes it easy for one man to off-bear all units produced when the machine is operating at full capacity. One plain pallet holding three standard block may be quickly placed on car or rack, states the manufacturer.

Another new unit is the art stone machine on which a cast stone veneer is produced on plain stripper blocks. It is said that all standard sizes of block or tile and ashlar units may be faced on this machine.

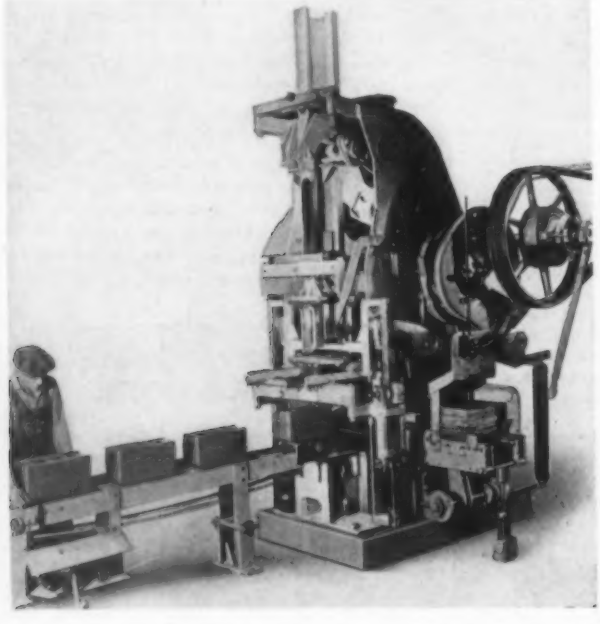
An improvement to the Besser plain pallet stripper is the automatic pallet feeder and automatic front conveyor. The plain pallet strippers are made in production capacities from 300 to 3000 per day.

THE MULTIPLEX CONCRETE MACHINERY CO., Elmore, Ohio, displayed several new and improved units, including the master press, the standard 8 tamper, multi-geared head motor drive mixer, and the variable speed lever press vibrator, which was described and illustrated in the February issue of ROCK PRODUCTS. A flue block machine also was displayed.

A production capacity of six standard block per minute may be obtained with the master power press. The principle of vibration also has been incorporated into the design, giving vibration with pressure. Variable speed is possible with this machine.

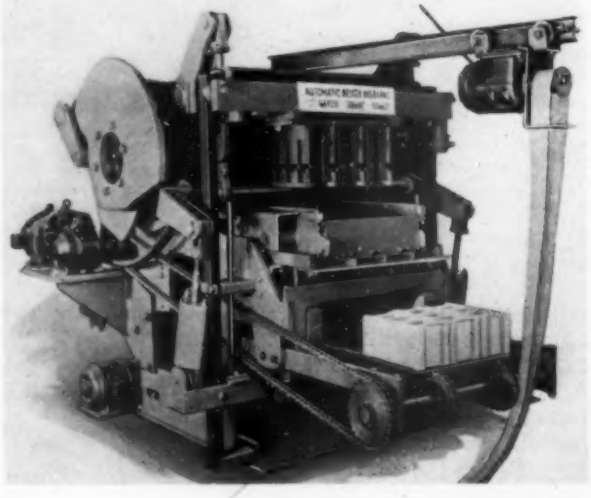
Vibration with pressure is incorporated in this new concrete block machine

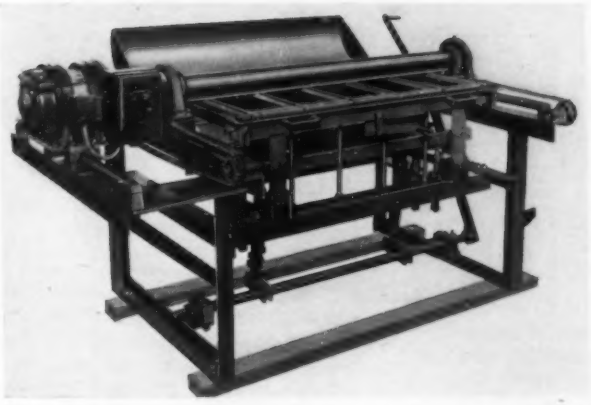
PRICE BROTHERS CO., Dayton, Ohio, displayed the Flexicore system for the manufacture of concrete sewer pipe, conduits, drainage pipe, etc. This method, illustrated herewith, makes possible the construction of ducts, conduits or other circular openings in sizes from 1-in. to 24-in. diameter, and of any desired length. It consists essentially of a rubber hose which expands under either



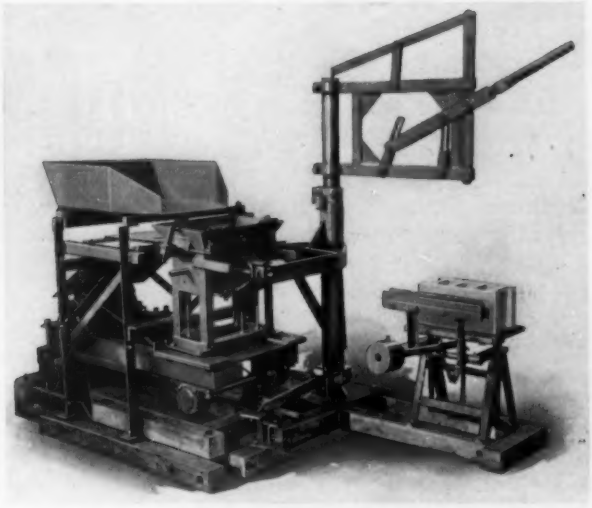
Left: Plain pallet stripper squipped with automatic pallet feeder and automatic front conveyor

Below: Automatic plain pallet stripper with a production capacity of 560 standard blocks per hour having "undirectional vibration"



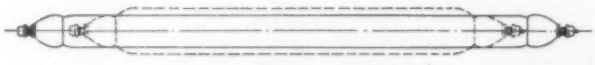


Above: Art Stone machine which will face all standard sizes of block or tile and ashlar units



Right: Vibrator block and brick machine in which "undirectional vibration" is applied through horizontal arms that absorb vibration

air or water pressure to a predetermined diameter and and at the same time decreases in length. Deflation of the core reverses the action, decreasing the diameter as the length increases. It is said that the maximum increase in diameter is about 30 percent and the longitudinal contraction is about 15 percent under working pressures as low as 20 p.s.i. for the larger sizes.



Sketch shows the deflated core in solid lines, and the same core inflated in dotted lines

STEARNS MANUFACTURING CO., Adrian, Mich., displayed for the first time Model 7 Joltcrete which incorporates all of the principal features of the Model 9. It is equipped with the identical vibrating mechanism used in the larger machine, but the production is slightly less. The Model 7 has a production capacity of seven 8- x 8- x 16-in. block per minute. Normal performance is 3½ cycles per minute or 400 blocks per hour. It also may be set up to produce one 8- x 10- x 16-in. and one of the 8- x 12- x 16-in. per operation, and four of the 4- x 8- x 16-in. at a time, and a multiple of other sizes and types that are recognized as standard concrete building units. The machine is 61½ in. high, and occupies very little floor space, 75- x 76-in.

Another development is the Stearns clipper tamper with down face attachment. It is identical to the Stearns clipper stripper. The face attachment produces full and fractional lengths and corner block in plain, panel and rock face. The tamping mechanism is the same as the alternate eight-bar tamping action and is easily removed for replacement with a different mold box. This equipment has a capacity of 150 block per hour.

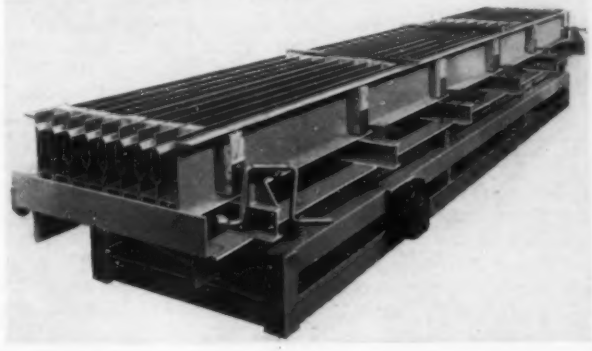
Additional information describing auxiliary concrete products equipment and new units and materials which were on display will appear in a later issue.

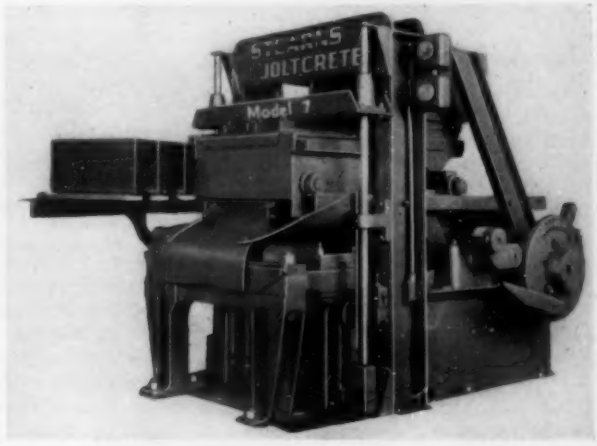
Construct Large Capacity Block Plant

CURRIER LUMBER CO., Detroit, Mich., has built what is claimed to be one of the largest and most modern concrete block manufacturing units in the Middle West. In addition to six large seasoning and drying kilns, there is a storage building with a very large capacity. The plant has a floor area of 30,000 sq. ft. Aggregates enter the plant either by railway car or truck, and are elevated to the third floor where they are automatically weighed and mixed with cement, and then are conveyed down to the ground floor where the block machines are located. Harry Currier is manager of the plant, and Harry Ludwig is construction engineer. Further details regarding this plant will be published after it has been in operation.

Right: Block machine with a capacity of 400 standard units per hour incorporates principle of vibration of limited amplitude

Below: Joist machine designed to make 8-in., 10-in., and 12-in. joists





NEWS of the month

National Stone Co. Purchased By Ellwood Stone Co.

ELLWOOD STONE CO., Ellwood, Penn., has purchased the National Stone Co., New Castle, Penn. The new owners have taken possession of the quarry which will be under the supervision of J. D. Sartwell, general manager, with W. H. Jones and R. T. Jones handling sales. The plant will employ 20 to 25 men with the present officers of the Ellwood Stone Co., David J. Jones, president; J. D. Sartwell, vice-president and treasurer; W. H. Jones, secretary, and R. T. Jones, assistant treasurer, serving as officers of the new company. Refractory stone for converter linings in Bessemer steel mills, linings for foundry cupolas, etc., are produced at the National plant. The Ellwood company cuts bridge piers, retaining walls, rip rap, and fire place stone. It also produces molding sand, furnace sand, glass sand and core.

Dynamite Blast Damages Cement Plant

COLORADO PORTLAND CEMENT CO. suffered a $100,000 loss in damages to its plant near Fort Collins, Colo., when three truckloads of dynamite exploded in a garage where it was being thawed out. Two men were killed. According to Ira J. Dilts, superintendent, machinery and equipment in the $2,775,000 plant had not been damaged except for one overhead conveyor. All concrete structures, such as storage silos, escaped damage, the greatest loss being in the destruction of the garage, office building, and windows. A full force of men are working on the reconstruction of the plant.

Complete New Lime Plant

CUMMER LIME & MANUFACTURING CO., Kendrick, Fla., recently started operations in new plant of modern design for the production of a complete line of lime products, including chemical hydrate, masonry hydrate, quicklime, spray lime, agricultural lime, and a new masonry limestone building unit, said to have some exceptional characteristics. Officers of the new company are: A. G. Cummer, president; John L. Roe, treasurer; Edward C. Roe, vice-president and general manager.

The lime plant is designed, according to the report, for special selection and preparation of kiln stone of exceptionally high chemical composition, and will be supplied from the Cummer limestone deposits estimated to contain 10,000,000 tons of a very pure limestone. The masonry unit plant is located near the lime plant.

Install Dust Collectors To Remove Stack Dust

OKLAHOMA PORTLAND CEMENT CO., Ada, Okla., recently completed the installation of dust collectors to remove dust from two cement kiln stacks. The collected dust is fed back into the kiln with the filter cake. A dust count on the two stacks before the installation of the collectors indicated a dust loss of approximately 0.38 grams per cu. ft. of gas. Three all-metal Norblo type H. E. L. S. collectors, recently developed, have been installed for each kiln. To these collectors, each kiln fan delivers 75,000 cu. ft. of gas per minute at 305 deg. F. The static drop through the collector is approximately one inch, water gauge. Overall efficiency, according to reported field tests, is said to be 80 percent or better, with particle sizes ranging as follows: 34 percent, 7½ microns; 99 percent, 60 microns.

Completes New Gypsum Plant

UNITED STATES GYPSUM CO., Chicago, Ill., has announced the completion of its new plant at Jacksonville, Fla., where finished products ranging from plaster and plaster bases through a number of important materials for all kinds of construction will be made available to the Southeast. Crude gypsum rock is unloaded at the docks of the new plant from company-owned ships sailing direct from the Nova Scotia rock deposits owned by the company.

Rock Wool Plant Remodeled

TENNESSEE PRODUCTS CO., operating plants at Rockdale and Wrigley, Tenn., has started up operation of its rock wool plant at Rockdale and has placed in service new machinery to make rock wool bats. Heretofore, this plant only made loose wool.

Ohio Ready Mixed Concrete Men Meet in Cincinnati

THE OHIO READY MIXED CONCRETE ASSOCIATION, a new organization in 1938, held an interesting luncheon meeting while the National Sand and Gravel Association convention was being held in Cincinnati, Ohio. The meeting was attended by representatives from practically all the 22 member companies.

In formulating an operating program for 1939, the Association voted to establish associate memberships for which machinery manufacturers, and other organizations in the state selling supplies to the members are eligible.

Stephen Stepanian, Arrow Sand and Gravel Co., Columbus, is president, and Claude Clark is secretary of the Association and also of the Ohio Sand and Gravel Association.

Cement Plants Reopen

UNIVERSAL ATLAS CEMENT CO. resumed operation at its Ilasco plant south of Hannibal, Mo., after having been closed down during the month of January for repairs and improvements.

LONE STAR CEMENT CORP. started up the Spocari, Ala., plant with production 50 percent of capacity. Operation will be on a full day and night, seven-day a week schedule.

CONSOLIDATED CEMENT CORP., Fredonia, Kans., expected to resume operation the latter part of February, just as soon as repairs could be completed.

THE PENN-DIXIE CEMENT CO. plant at Clinchfield, Ga., reopened on February 1 after having been closed for a month.

Trends As Evidenced By Purchases

B. V. HEDRICK GRAVEL AND SAND CO., Lilesville, N. C., has installed a 4- x 12-ft. double-deck "Seco" vibrating screen. Several screens of this type had been installed by the company during 1938. Screen Equipment Co. reports several additional recent installations of "Seco" screens as follows: The Alliance Sand Co., Palmerton, Penn., 4- x 10-ft. triple-deck; West Roxbury Trap Rock Co., West Roxbury, Mass., 3- x 9-ft. screen; A. Petrillo Co., Wilmington, Del., 4- x 10-ft. triple-deck; A. N. Farnham Co., New Haven, Conn., 4- x 10-ft., three and one-half decks.

Purchases Aggregates Plant

CENTRAL PREMIX CONCRETE CO., Spokane, Wash., has purchased the assets of the Union Sand and Gravel Co. The plant, located at Fort Wright, Wash., near Spokane, is now in active production. The deal, which was a $20,000 transaction, involved the sale of the 90-acre deposit, the washing plant and trucking equipment.

New Gravel Plant In Operation

HUBBS BUILDING MATERIAL CO., Colton, Calif., a new concern, has completed a new plant in Colton to specialize in the production of plaster sand, concrete sand and gravel. Capacity is about 35 cu. yd. per hour, the total investment for property and equipment representing a cost of $25,000. Members of the firm are Jesse Hubbs, Edward J. Ducey, Walter Christensen and H. L. Adelquist.

Quarry Activity In the Middle West

THE MCDOWELL CONSTRUCTION CO. has installed rock crushing equipment at Elwell Hill, Mo. Bins and foundations were completed late in January.

GEO. GEBHARDT, St. Louis, Mo., started work at the old stone quarry located near Gray's Point. Ten men are now employed on the project.

JOHN PETERSON, a veteran quarryman, has leased a limestone quarry near Mt. Pleasant, Iowa. He recently placed a crusher in operation to produce agstone and crushed rock for highways, farmers lands and feed lots.

New Stone Corporation Formed by Merger

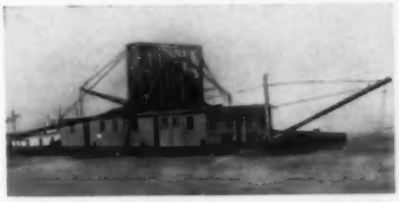
BUFFALO CRUSHED STONE CORP., a new company, has been organized to acquire all real estate, plants and equipment at the Akron, N. Y., operation of the General Crushed Stone Co., and the Bowmansville, N. Y., operation of the Buffalo Crushed Stone Co. These two plants will be owned, controlled and managed by the new concern.

The board of directors of the Buffalo Crushed Stone Corp. will consist of the following: O. M. Graves, James Savage, Arthur Savage, F. W. Schmidt, John H. Schmidt and A. G. Seitz. Officers of the company will be F. W. Schmidt, president and general manager; John Schmidt, vice-president and chief engineer; A. G. Seitz, vice-president in charge of operations; James Savage, secretary-treasurer and resident manager; and Arthur Savage, assistant secretary and assistant treasurer. A. J. Hooker, for many years sales manager for the Buffalo Crushed Stone Co., will be appointed sales manager of the new company. Thomas Cave, superintendent of the Bowmansville plant, will be appointed superintendent and Paul Gibbons, superintendent of the Akron plant, will be named assistant superintendent.

The Buffalo Crushed Stone Corp. will own approximately 750 acres of high quality limestone deposits and two modern crushing plants with an annual crushing capacity of 750,000 tons. In addition to the production and marketing of crushed stone in the Buffalo area, the corporation will also engage in the manufacturing and marketing of bituminous concrete paving materials.

Diesel-Powered Dredge

OPERATING on the Ohio river near Caseyville, Ky., a new diesel-powered dredge owned by the Union Sand and Gravel Co., is setting some records for low-cost gravel production. According to Ray Maddox, general superintendent, the plant operates at an hourly production of 60 cu. yd. or 100 tons of road



Dredge of the Union Sand and Gravel Co., on the Ohio river is operated with Diesel engine

gravel with a fuel cost of less than one-third of a cent per ton.

The dredge boat is a covered, flush deck wood hull barge, 28- x 74-ft., and is divided into two compartments, one for the crew quarters and the other for the operating equipment. In the latter compartment, a Model HP-601 Cummins Diesel engine drives an 8-in. Holz dredge pump. Both engine and pump are mounted on the deck across the kelsons parallel with the beams, and lagged down with long bolts through 3- x 10-in. oak timbers. The timbers are spaced about 2 ft. apart running under three beams.

The Diesel engine is equipped with both front and rear end drives. The rear end drive, through the clutch and outboard bearing, carries a 13.4-in. V-belt sheave. This is connected with six D-section V-belts 180 in. long to a 40.2-in. sheave on the pump. The engine operates at 1200 r.p.m., and the 3:1 reduction effected by the sheaves runs the pump at 400 r.p.m. River water is used in cooling the engine through a gear-type water pump without the use of a radiator or fan.

The front end drive, which can take the full engine horsepower, consists of a solid coupling, shaft and outboard ball bearing. Mounted on this shaft is an 8-in. crown pulley driving to a 24-in. pulley on a single drum hoist, which is used to raise and lower the suction line of the pump. The hoist cable operates through a double and a triple sheave on the boom, providing a line pull of approximately 60 ft. per minute. Also mounted on this shaft is another 8-in. pulley with a flat belt drive to a 5-in. pulley. This powers a small Gardner-Denver centrifugal pump and provides washing water over the sand and gravel screens.

The vertical pumping head to the screens, including line friction, is approximately 50 ft. Pumping is usually done from depths of 12 to 50 ft.

Although the pump actually weighs more than the engine, the Diesel is able to handle the load with ease. Even when all of the equipment being powered from both ends of the engine is thrown on at once, the Diesel never loses an r.p.m.

Aside from its power and economy, one of the principal reasons for the selection of the Diesel was the elimination of the hazard of fire, which completely destroyed the previous dredge. The dredge has been in operation since October, 1938, working 10 to 12 hours a day. The Union Sand and Gravel Co. has operated dredges between Owensboro and Paducah for several years.

McGrath Building Large Gravel Plant

MCGRATH SAND AND GRAVEL CO., Lincoln, Ill., is reported to be constructing a large washing and screening sand and gravel plant near Bloomington, Ill. The new plant is to be served directly by the Alton railroad, and is to have a daily capacity of about 2500 tons. The new plant is being constructed to replace the Mackinaw plant, now being dismantled.

White Rock Quarries Are Busy

WHITE ROCK QUARRIES CO., Bellefonte, Penn., reports that all of the company's 18 kilns at Pleasant Gap are operating at 100 percent capacity. The payroll numbers 235 employes, the largest in the company's history. In addition to operating its quarries and plant at Pleasant Gap, the company has opened up a quarry in the vicinity of Jacksonville, Penn.

FINANCIAL NOTES

RECENT DIVIDENDS ANNOUNCED

Alpha Portland Cem.	$ .25	Mar. 25
Basic Dolomite, Inc.	.12½	Mar. 15
Calaveras Cement Co., pfd.	1.00	Feb. 18
Lone Star Cement Co.	.25	Mar. 31
National Gypsum Co., new pfd. initial dividend	1.12½	Mar. 1
Riverside Cement Co., pfd.	1.50	Feb. 1
Westvaco Chlorine Prod.	.25	Mar. 1
Westvaco Chlorine Prod., pfd.	.37½	Feb. 1

UNITED STATES GYPSUM CO., Chicago, Ill., reports net income of $4,725,497 in 1938, equivalent to $3.50 a share on outstanding common stock after preferred requirements. In 1937, the net earnings were $5,421,010, or $4.08 a share. Expenditures during the year for additions and improvements to plant assets totaled $2,299,860, including the Jacksonville, Fla., plant, now in operation.

•

ARUNDEL CORP., Baltimore, Md., had a net income of $997,283 or $2.10 a share for 1938, against $813,724 or $1.68 a share for 1937. Uncompleted contracts on the company books totaled $9,140,723 as of January 1, 1939.

•

MICHIGAN SILICA CO., Rockwood, Mich., reports a net profit of $37,785 for the year ended December 31, 1938, as compared with $38,135 in 1937. Net sales for 1938 were $211,632 as against $218,691 in 1937.

•

CORONET PHOSPHATE CO., New York, N. Y., with several plants in Florida, had a net income of $55,497 for the year ended December 31, 1938, as compared with $132,786 in the same period in 1937.

•

INDIANA LIMESTONE CORP., Bedford, Ind., reports a net loss of $758,273 for the year ended November 30, 1938, as compared with a net loss of $646,795 in 1937.

•

PACIFIC COAST AGGREGATES, INC., San Francisco, Calif., shows a net loss of $47,545 for the eleven months ended November 30, 1938, as compared with a profit of $4827 in the same period in 1937. The company has submitted to stockholders a proposal under which stated capital would be reduced from $5,599,924 to $2,885,558 by reducing the common stock from $10 to $5 par value. The plan also proposes that authorized capital stock be increased from 600,000 to 1,500,000 shares.

•

GIANT PORTLAND CEMENT CO., Philadelphia, Penn., reports a net loss of $100,373 for the year ended December 31, 1938, as compared with a net income of $44,409 for the same period in 1937.

•

MISSOURI PORTLAND CEMENT CO., St. Louis, Mo., showed a net profit of $134,304 in 1938, equal to 48c a share on 282,406 shares of common, compared with $403,675, or $1.43 a share in 1937.

•

PETOSKEY PORTLAND CEMENT CO., Petoskey, Mich., had a net profit of $79,547 for the year ended December 31, 1938, as against $125,763 for the same period in 1937. Net sales for the year were $1,430,482 as compared with $1,616,254 in 1937.

•

LAWRENCE PORTLAND CEMENT CO., Northampton, Penn., showed a net loss of $126,964 for the year ended December, 1938, as compared with a net profit of $127,318 in 1937.

•

RIVERSIDE CEMENT CO., Los Angeles, Calif., shows a net profit of $331,217 for the year ended December 31, 1938, after all charges including provision for depreciation and federal income taxes, equal, after $224,782 dividends paid on first preferred stock, to 4c a share on 240,000 shares of class A stock outstanding, on which cumulative dividends of $6.47½ a share were in arrears at the year-end. This compares with a net profit of $560,107 after similar charges for the year 1937. Last year, 2722 shares of outstanding preferred stock were retired.

•

SIGNAL MOUNTAIN PORTLAND CEMENT CO., Chattanooga, Tenn., had earnings of $200,000 for 1938, an increase of $25,000 over 1937, according to a report presented by John L. Senior, Chicago, president of the company. There were no changes in officers or directors.

•

CELOTEX CORP., Chicago, Ill., has taken over complete ownership of the American Gypsum Co., Port Clinton, Ohio. Celotex had owned 56.33 percent of the subsidiary's preferred and 46.87 percent of the common.

•

LEHIGH PORTLAND CEMENT CO., Allentown, Penn., reports for the year ended December 31, 1938, a net profit of $704,003 after taxes, depreciation, depletion, obsolescence, etc., equal after dividends paid on 4% preferred stock, to 63c a share on 754,434 shares (par $25) of common stock. This compares with $1,250,544 or $1.35 a share on 754,491 shares of common stock in 1937.

•

WOLVERINE PORTLAND CEMENT CO., Coldwater, Mich., shows a net loss of $2692, after taxes, depreciation, etc., for the year ended December 31, 1938. This compares with a net profit of $9431 for the same period in 1937.

•

ALBERENE STONE CORP. OF VIRGINIA, New York, N. Y., reports a net income of $15,576 for the year ended December 31, 1938, as compared with $53,573 for the same period in 1937. Net sales for the year were $481,072 as compared with $631,973.

•

PACIFIC PORTLAND CEMENT CO., San Francisco, Calif., at a stockholders' meeting, voted to cut the book carrying value from $100 to $10 a share on 80,824 shares of common, creating a reduction surplus of $728,747.

•

SUPERIOR CEMENT CORP., Portsmouth, Ohio, will be reorganized under section 77-B of the bankruptcy act. The company's petition listed assets of $1,130,787 and current liabilities of more than $198,000. Fred Kanengeiser will continue as manager of the plant under Trustee William J. Jones. The company's tentative reorganization plan provides for issuing $500,000 first mortgage bonds maturing January 1, 1949 and exchanging present stock for a new issue.

•

GYPSUM, LIME & ALABASTINE, Canada, Ltd., Paris, Ont., reports net profit of $74,316 for the year ended November 30, 1938, which compares with $62,365 for the same period in 1937. Col. Henry Cocksutt, chairman, reports that prospects for 1939 look good, the month of November showing a gain of 8 percent over the same month a year ago.

•

W. M. MARTIN and W. H. HARRISON, Huntington, W. Va., are organizing a company to operate a sand plant at Ardel, W. Va. A new plant is to be built at a cost of $15,000 to produce an engine sand to be sold to coal mines and railroads. Capacity will be four or five carloads of sand a day.

Check Settles Long Standing Suit

STANDARD TRAP ROCK CO., New York N. Y., received recently a check from the State of New York for $2,110,000 in final settlement of the condemnation of the company's property by the Palisades Park Commission. The case had been in the state courts for ten years and was argued and reargued several times. The property was acquired and a modern plant built in 1929 with the knowledge of the Palisades Park Commission. Subsequently they stepped in and seized the plant before production had actually gotten under way. Since then it has been a lawyers' battle to determine how much was due the company. The lawyers used many expert witnesses on both sides—a list would include many well-known names. The damage award was $1,332,000 and the balance was interest at 6 percent.

It was erroneously reported in ROCK PRODUCTS several months ago that the suit had been settled. That was merely a redecision by the court of appeals. Subsequently the case was reassigned by the state supreme court to a special master whose decision was finally accepted by the supreme court.

Large Concrete Products Unit for Delaware

DELAWARE CEMENT PRODUCTS CO., Seaford, Dela., is the name of a newly organized concern which has been capitalized at $50,000. It recently purchased an 88-acre tract near Seaford, and will erect a concrete brick and block plant, according to Paul A. Duane, Easton, Md., president.

Industrial Sand Convention

THE BOARD OF DIRECTORS of the National Industrial Sand Association announce that the Fourth Annual Convention of the association will be held at the Ambassador Hotel in Atlantic City, N. J., on May 24, 25, and 26. Convention proceedings will commence with the annual meeting of the Board of Directors at 2:00 p. m. on May 24; there will be morning and afternoon sessions on May 25; and May 26 will be devoted to plant inspections in the South Jersey area.

News About Ready Mixed Concrete

LONGVIEW CONCRETE PIPE CO., Longview, Wash., has branched out in the ready mixed concrete business, having recently purchased a $5000 central batch mixer. In addition to the new equipment, the company installed a cement storage bin which, according to George F. Ruth, manager, has a capacity of 22½ tons. A dust collector system also will be installed.

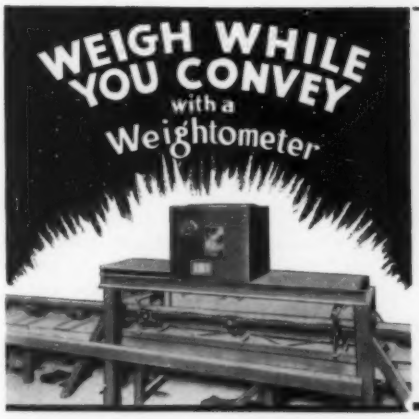
STERGION CONCRETE PRODUCTS CO., Enumclaw, Wash., has installed new bunkers and batching equipment and has purchased a transit mixer truck.

READY MIXED CONCRETE CORP., Indianapolis, Ind., will pass into the hands of new owners. The late Harvey A. Tutewiler, who was killed in an automobile accident a short time ago, provided in his will for the immediate sale of his majority interest in the company. It was specified that the 888 shares of common stock should not be sold for less than $245 a share.

Open New Plant

RALPH C. BENNETT recently started a new concrete block plant at Aurora, Ind. Mayor Harry C. Watts officiated at the opening ceremonies. Cletus Engler of West Aurora will be associated with Mr. Bennett in the new enterprise.

RECENT PURCHASES of concrete block machinery include: Lincoln Cement Block Co., Kalamazoo, Mich., a Stearns clipper stripper; Harry Wellnitz, Columbus, Ohio, a Stearns Joltcrete model No. 9; and Tri-State Cemroc Co., Covington, Ky., a Stearns Joltcrete model No. 7.



For over 30 years the Cement and Allied Industries have used Merrick equipment for weighing, feeding and proportioning. Many original installations are still in daily service. Successful operators continue to specify Merrick equipment, time-tried and proved and built for today's needs.

Send for Bulletin No. 375.

MERRICK SCALE MFG. CO.

188 AUTUMN ST. PASSAIC, N. J.

* *Note: Materials are handled faster at lower cost with this Modern Equipment!*

P&H Model 150, ½ yard Shovel.

P&H EXCAVATORS

Built of alloy rolled steels, these new P&H's are better equipped for high production . . . through more years of service — with greater freedom from repair bills. Available in sizes up to 5 cu. yds. capacity; Gas, Diesel or Electric Power. Write for literature on the size you need. Harnischfeger Corporation, 4465 W. National Avenue, Milwaukee, Wisconsin.

HARNISCHFEGER CORPORATION

MARCH ON
TO
GREATER PROFITS
WITH
SECO
VIBRATING SCREENS

THE LEADER IN THE FIELD

JOIN THE ARMY

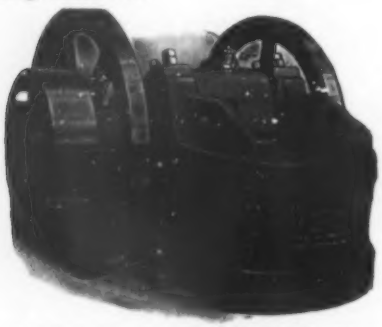
of enthusiastic owners who are producing material faster, with more accurate sizing and lower maintenance cost than ever before.

Send for Your 1939 Catalog

SCREEN EQUIPMENT CO., Inc.
9 Lafayette Ave. *Buffalo, N. Y.*

BACON
FARREL
CRUSHERS

Complete Plants Designed and Equipped. Screens, Elevators, Conveyors, Quarry, Sand and Gravel Plant Equipment. Engineering Service.



EARLE C. BACON, Inc.
17 John Street New York, N. Y.

Portland Cement Statistics

IN DECEMBER, 1938, the portland cement industry produced 8,066,000 bbl., shipped 6,281,000 bbl. from the mills, and had in stock at the end of the month 23,964,000 bbl., according to the Bureau of Mines. Production and shipments of portland cement in December, 1938, showed increases of 14.5 and 31 percent, respectively, as compared with December, 1937. Portland cement stocks at mills were 3.9 percent lower than a year ago. The preliminary totals of production and shipments for 1938 show decreases, respectively, of 9.1 and 6.4 percent from the final totals for 1937.

Total production for the 12 months ended December 31, 1938, amount to 105,548,000 bbl., as compared with 116,175,000 bbl., for the same period in 1937.

Statistics here given are compiled from reports for December received by the Bureau of Mines from all manufacturing plants.

RATIO (PERCENT) OF PRODUCTION TO CAPACITY

	December 1937	1938	Nov. 1938	Oct. 1938	Sept. 1938
The Month	32.3	36.9	48.2	52.9	49.9
12 Months	45.3	41.0	40.6	40.2	40.2

Sand-Lime Brick Production and Shipments

EIGHT active sand-lime brick plants reporting for January and nine for December, statistics for which were published in January.

Average Price for January

	Plant Price	Delivered Price
Detroit, Mich.	.....	$16.00
Grand Rapids, Mich.	$11.00	14.00
Milwaukee, Wis.	10.00	12.50
Mishawaka, Ind.	10.50	.....
Saginaw, Mich.	11.00	.....
Syracuse, N. Y.	14.00	16.00 C/L 20.00 L/C

Statistics for December and January

	December†	January‡
Production	2,147,860	1,173,500
Shipment (rail)	243,000	152,000
Shipment (truck)	1,922,822	1,177,272
Stock on hand	1,036,230	915,861
Unfilled orders	245,000	110,000

†Nine plants reporting: incomplete, three not reporting stock on hand and five not reporting unfilled orders.

‡Eight plants reporting: incomplete, four not reporting stock on hand and six not reporting unfilled orders.

Milwaukee Concrete Products Men Elect Officers

WALTER J. MANHARDT, general manager of the Best Block Co., Milwaukee, Wis., was recently elected president of the Milwaukee Concrete Products Association. He succeeds Frank E. Glasa. William P. Goetzinger, of Erdmann & Goetzinger Co., was elected vice-president; Otto Ladwig, Jr., secretary of Otto Ladwig & Sons Co., was reelected treasurer, and Walter A. Sherman was reelected secretary. Directors are: Arthur Vander Heyden, Frank E. Glasa, Michael Engersbach, and Herbert A. Schwan.

Activities in the Concrete Pipe Industry

ELK RIVER CONCRETE PRODUCTS CO., Billings, Mont., is the newest of three concrete pipe plants operated in the state by this company, the others being situated at Helena and Miles City. The new plant consists of a boiler room, a concrete mixing and molding room, and four steam curing rooms. Concrete pipe will be steam cured for 60 hrs. after the concrete is poured in the molds. Early H. Eby, manager, reports that the Billings plant will manufacture about 170 ft. of 36-in. sewer pipe daily for a local sewer project. The plant also will turn out 24-in., 27-in., and other pipe sizes.

BAKER CONCRETE PIPE CO., Enid, Okla., has been awarded a contract for concrete sewer pipe covering the following prices and quantities: 1 to 500 tons, $4.90; 500 to 1000 tons, $3.90; 1000 to 2000 tons, $3.60; and $3.40 for over 2000 tons. These prices were the same for specifications covering plain concrete sewer pipe and the heavy wall, plain or reinforced tongue-and-groove concrete sewer or culvert. Other bidders were Shearman Concrete Pipe Co., Ward-Beckman Concrete Pipe Co., and Tishomingo Concrete Pipe Co.

THE LOCK JOINT PIPE CO. will erect a concrete pipe plant near Natick, Mass., to supply pipe for the aqueduct which will carry the waters of Wachusetter and Quabbin Reservoirs to Boston, Mass. The contract involves a $4,000,000 expenditure. About 150,000 cu. yd. of sand and gravel will be required.

Concrete Pavement Yardage

AWARDS of concrete pavement for December, 1938, for the calendar year 1938 and for January, 1939, have been announced by the Portland Cement Association as follows:

Type of construction	Sq. yds. awarded during Dec., 1938	Sq. yds. awarded during Jan., 1939
Roads	2,765,144	2,985,390
Streets	1,457,908	.....
Streets & Alleys	.....	1,104,801
Alleys	47,181	.....
Airports	.....	63,511
Total	4,270,233	3,253,702

Type of construction	Total sq. yds. during the year 1937	Total sq. yds. during the year, 1938
Roads	39,670,238	36,900,856
Streets	13,845,273	17,455,733
Alleys	663,238	860,183
Total	54,178,749	55,216,772

Convention Exhibits

(Continued from page 43)

cone crusher. Photographs showed cross section views of crushers and classifiers. Representatives included: Harry Buckenheu, A. C. Colby, Victor F. Larson, A. E. Owen, J. M. Thistlewaite, and Chas. E. Wood.

Northern Blower Co., Cleveland, Ohio, exhibited seven large photographs of dust collecting and air separator equipment some of which showed cut-away sections to reveal construction details. Representatives included: M. A. Eiben and John Wild.

Pettibone-Mulliken Corp., Chicago, Ill., showed illustrations of dippers, dredge pumps, chain cutters, wear resistor for dredge pumps, and manganese steel castings. Representatives included: Maurice P. Angland, G. S. Swanson, J. W. Meckenstock, and J. M. Trittenbach.

Ransome Concrete Machinery Co., Dunellen, N. J., had a model of a truck mixer and photographs showing various types of truck mixers and batchers. L. R. Wilson represented the company.

Robins Conveying Belt Co., New York, N. Y., had a model of a vibrating screen, samples of conveyor belt idlers, and a large panel of photographs in the background showing three types of vibrating screens and installations of conveyor belt equipment. Representatives included: R. W. Jackson, Maurice B. Bradley, Ray E. Church, A. E. Conover, Max S. Lambert, and A. F. Mathley.

John A. Roebling's Sons Co., Trenton, N. J., had a display of wire rope samples and screen cloth. Representatives included: J. Fennell Berger, G. K. Hayes, and P. G. MacIntosh.

Sauerman Bros., Inc., Chicago, Ill., had a panel of illustrations showing applications of sand and gravel recovery equipment. Representatives included: D. D. Guilfoil, P. L. Patterson, G. H. Tompkins, Wm. T. Walsh, and Arthur G. Wilson.

Screen Equipment Co., Buffalo, N. Y., exhibited a 4- x 10-ft. Type S, Seco double-deck vibrating screen. Representatives included: A. E. Fielding, Carl C. Foeller, and Ralph S. Hunt.

Simplicity Engineering Co., Durand, Mich., had on display a panel of photographs showing various screen applications. Representatives included: R. C. Johnson, F. D. Barber, and Fred I. Buell.

Smith Engineering Works, Milwaukee, Wis., had a complete working model of a screening and crushing plant which was shown for the first time at this convention. Also displayed were photographs of crushers and installations of equipment. Representatives included: A. R. Amos, Jr., D. D. Barnes, W. H. McIlhany, James Monroe, A. L. Munro, Gerald L. Smith, F. L. Webster, and Henry M. Wood.

T. L. Smith Co., Milwaukee, Wis., showed illuminated photographs of various types of truck mixer equipment. Representatives included: F. E. Bager, C. Taylor Hanchman, and H. C. Peters.

Taylor-Wharton Iron & Steel Co., High Bridge, N. J., had an illuminated display of steel being poured. Representatives included: K. D. Crawford, Ralph Detmer, J. A. Krugler, H. Brinton McDermett, H. F. McDermett, J. A. Trainor, and J. R. Van Rensselaer.

Thew Shovel Co., Lorain, Ohio, had large photographs of shovels mounted in panels at the back of the booth. Representatives included: M. B. Garber, and Thomas F. Henson.

Transit Mixers, Inc., New York, N. Y., displayed photographs of mixer trucks. R. McLean represented his company.

Traylor Engineering & Manufacturing Co., Allentown, Penn., exhibited a Type TY reduction crusher which was cut away to show construction details. Representatives included: A. C. Most, C. H. Patten, C. H. Roberts, and O. E. Thaleg.

W. S. Tyler Co., Cleveland, Ohio, had on display a Type E-500 Tyrock vibrating screen, a Hum-mer electric vibrating screen, testing screens, and samples of screen cloth. A panel of illuminated photographs showed various types of screens. Representatives included: Fred Braun, C. T. Bingham, Bryant Currier, W. Pringle, W. W. King, and N. P. Rough.

Prices Bid—Contracts Let

TOLEDO, OHIO: The city council adopted an ordinance to continue through 1939 a contract with the France Stone Co. for the purchase of crushed stone at 65c a ton. Under the contract, labor required to mine the stone at the quarry is furnished by the WPA.

BELLEFONTAINE, OHIO: F. H. Bailey & Sons, Kenton, was awarded the contract for supplying Bellefontaine with gravel, delivered for $1.49 per cu. yd., in connection with several WPA projects. The Bellefontaine Development Co. was awarded the contracts for washed sand at $1.60 per cu. yd. and cement at $2.10 per bbl.

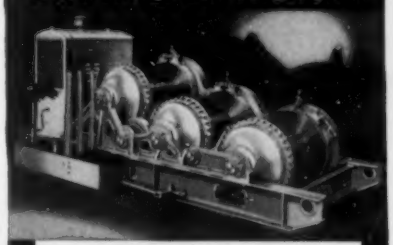
COLUMBIA, S. C.: The Santee-Cooper authority awarded a $1,250,000 contract for delivery of 600,000 bbl. of cement, or $2.08⅓ per bbl., to the Pennsylvania-Dixie Cement Corp., for delivery to the various places designated for the Santee-Cooper electric power project.

MANSFIELD, OHIO: Low bidders for materials and supplies to be used by the Mansfield street department this year were: Purdy Construction Co., for 20 cars concrete sand at 95c per cu. yd.; Purdy Construction Co., for 10 cars masons' sand at $1.25 per cu. yd.; identical bids by Kallmerten and Baer and Voegele, Rusk, Small, and Lomas for 5 cars granulated slag at $2.09 per cu. yd. of grade "A" and $1.61 per cu. yd. of grade "B"; Purdy Construction Co., for 50 cars grade "A" gravel at $1.09 per cu. yd.; H. W. Fleck for 2000 cu. yd. bank run gravel at 25c per cu. yd. at bank and 70c delivered; H. W. Fleck for 2000 cu. yd. crushed gravel at 50c per cu. yd. at bank and 60c delivered; identical bids by Branyan, Kallmerten and Baer, Voegele, Rusk, Small, Lomax, Builders Supply Co., and Purdy Construction Co., for 100 cu. yd. pre-mixed concrete at $9.75 per cu. yd. and $11.75 per cu. yd. for fast setting mixture, with $1.00 to be added for heating.

SARDIS, MISS.: The War Department let a contract at $1.35 per cu. yd. to J. L. Shiely Co., St. Paul, Minn., for 175,000 cu. yd. of stone for rip rap for construction of the upstream slope for Sardis Dam in Panola county.

COVINGTON, KY.: Contractor's Materials Co., Cincinnati, Ohio, was awarded a contract for 2600 tons of lake sand at $2.56 per ton and the Ohio Gravel Co. was awarded a contract for 50 tons of slag sand at $5.65 per ton.

BUYING A HOIST?



JAEGER Touch Control Hoists—30 to 100 H.P. Offer You . . .

1: Giant Expanding Frictions, as on $15,000 Shovels, giving easy finger-tip control of loads.
2: Self-Aligning Anti-Friction Bearings standard equipment.
3: Accurately Balanced Drums.
4: Rigid Construction, Multi-Cylinder Power, Silent Chain Drive. 1 to 3 Drums (interchangeable). Gas or Electric.

Standardized construction (only 3 basic types for 30—100 H. P.) means big savings, lower prices. Get new Catalog.

THE JAEGER MACHINE CO.
603 Dublin Avenue, Columbus, Ohio

JAEGER

ACCURACY
PERFORATED METAL SCREENS
ACCURATE SIZING—LESS BLINDING
LONGER WEAR—LESS REPAIR
ROUND-SQUARE-SLOTS
WE CAN PERFORATE UP TO 1" THICK
LARGE STOCK OF RAW MATERIAL FOR QUICK SHIPMENT
Inquiries Promptly Answered
Standard Stamping & Perforating Co.
3131 W. 49th Place
CHICAGO, ILL.
SERVICE
PRICE
QUALITY

HERE'S YOUR BEST BUY IN VIBRATING SCREENS

Economical
Efficient
Reliable

● UNIVERSAL VIBRATING SCREENS are lower in first cost—low in operating cost and have an enviable record for superior performance under the most varied and exacting service conditions. Every part is made of the finest material so they will stay right on the job, year after year, turning out perfect work without attention.

A trial will convince you. Send for your copy of our 32-page catalog today.

UNIVERSAL VIBRATING SCREEN CO.
RACINE — — WISCONSIN

News of the Gypsum Industry

THE UNITED STATES GYPSUM CO., Chicago, has purchased the Nephi Plaster and Manufacturing Co., with plant near Nephi, Utah. Announcement has been made that the Nephi property will be operated as a division of the larger company. Approximately 30 men are employed.

NATIONAL GYPSUM CO., Buffalo, N. Y., has announced that the Niles, Ohio plant, recently destroyed by fire, will be rebuilt. The damage was estimated to run from $75,000 to $100,000, which was largely covered by insurance. A recently completed warehouse costing about $25,000 was saved.

Sells Interest in Gravel Company

DELL PALMER, president, Wichita Flint Gravel Co., Wichita, Kan., has sold his interest in the company to Grant A. Stannard, secretary-treasurer, and is retiring from business. Mr. Stannard, who owns the Stannard Construction Co., will continue to operate the plant.

Michigan Plant Installs Dust Collector

PETOSKEY PORTLAND CEMENT CO., Petosky, Mich., is now installing a dust collector system which will cost approximately $125,000. Experiments have been under way for several years to determine the design and equipment to be used in the installation.

Construct Lightweight Slag Aggregate Plant

WAYLITE-SUPEROCK CO., Chicago, Ill., is completing construction of a new plant at Bethlehem, Pa., to produce lightweight slag aggregate for the Eastern market. The new plant has a capacity of 7000 to 8000 tons of graded aggregate per month.

All-Steel Gravel Plant

MYERS GRAVEL AND SAND CO., Anderson, Ind., has started construction of a $25,000 all-steel plant on a recently-purchased 30-acre tract of land. The plant will have a capacity of 450 cu. yd. of gravel daily, and will start production about April 1. The other plant operated by the company will gradually be abandoned.

New Gravel Plant

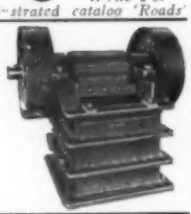
JESS T. HUBBARD, Mooreland, Ohio, has placed in operation a new hydraulic sand and gravel plant just south of Mooreland. Capacity of the dredge pump is 15 to 20 cu. yd. per hour.

ROADS whether mountain or farm to market under any condition
you can depend on
GRUENDLER EQUIPMENT
Established 1885

PORTABLE
HAMMER CRUSHERS
Ideal for farm to market road work. Crushes stone 2½ inch down to agriculture dust.

Write For Illustrated catalog 'Roads'

Bronze or Roller Bearing
JAW CRUSHERS
Heavy Armor plate steel or cast steel Constructed
Large capacity
Small power Requirements



STRAIGHT LINE ROCK AND GRAVEL CRUSHING AND SCREENING PLANTS

GRUENDLER
CRUSHERS · PULVERIZERS · GRINDERS
GRUENDLER CRUSHER & PULVERIZER CO.
2920-28 N. Market St., St. Louis, Mo.

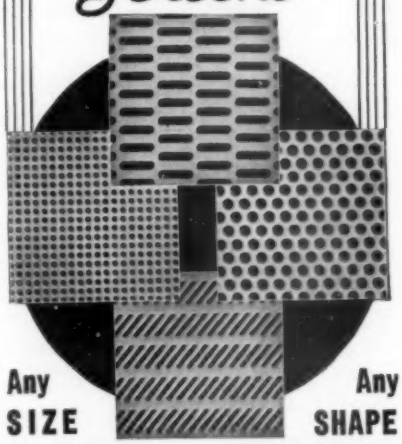
CUT PIPE COSTS

YOU CAN
Cold-Bend
NAYLOR
LOCKSEAM SPIRALWELD
PIPE

Cold-bending of Naylor Lockseam Spiralweld Pipe is an economy factor not found in any other light wall pressure pipe. That's why it will pay you to improve with Naylor Pipe.

GET COMPLETE DETAILS—WRITE TODAY FOR THE NAYLOR PIPE CATALOG
NAYLOR PIPE COMPANY
1237 EAST NINETY-SECOND ST.
CHICAGO, ILLINOIS

PERFORATED METAL
Screens



Any SIZE Any SHAPE
Any METAL Any PERFORATION

For vibrating, shaking and trommel screens.

Excellent material and workmanship for good screening results.

The Harrington & King PERFORATING Co.
5650 Fillmore St., Chicago—114 Liberty St., N. Y.

THE INDUSTRY

New Incorporations

Cindercrete Block Products, Inc., Kings, N. Y., has been granted a charter with a capital stock of 100 shares no par value. Agent is Julius Blumberg, Inc., 71 Broadway, New York, N. Y.

Delhi Foundry Sand Co., 6332 Lower River Road, Sayler Park, O., has been incorporated with a capital of $35,000. The firm has been in business since 1905 as a partnership of Harry F. McVay and James R. Ginn, who, with Louis Pierce, are the incorporators.

Alabama Sand & Gravel Co., Inc., Pensacola, Fla., has been granted a charter. Capital stock is 100 shares, $100 par value. D. W. Berry, E.E. Berry, and C. C. Price are directors.

Riverside Lime and Stone Co., 33 N. LaSalle St., Chicago, Ill., is the name of a new corporation with a capital stock of 100 shares par value common at $10 a share. Incorporators are J. Chavkin, J. C. Jaffe, and F. Schmit. Correspondent is D'Ancona, Pflaum and Kohlsaat, 33 N. La Salle St., Chicago.

Glacier Sand & Stone Co., Inc., Norwood, Mass., has been granted a charter. Capital is $50,000 and incorporators are Edward O'Toole, Mary L. O'Toole and Mary A. O'Toole, all of Westwood, Mass., and Leo T. Shine of Dedham, Mass.

Gibraltar Concrete Products Corp., Kings, N. Y., has been granted a charter with a capital of $20,000. Jancourtz & Goldman, 276 Fifth Ave., New York, N. Y., is agent.

Kenmore Concrete Products, Inc., is the name of a new Seattle, Wash., corporation. It has an authorized capital of $1000 and the incorporators are E. Thompson, Clyde U. Taylor and Will G. Beardslee.

Mississippi Pipe Concrete Corp., Tallahassee, Fla., has been incorporated by C. H. Spitz and B. C. Willis.

Alamance Stone Co., Burlington, N. C., has been incorporated by Collier Cobb, Jr., and Roy M. Homewood.

Kenosha Lakeshore Sand & Gravel Co., is the name of a new corporation in Kenosha, Wis., with an authorized capital stock of 250 shares of no par value common stock. Incorporators are Wm. Ashmus, John P. Kraak, and Dominick Tirabassi.

Auburn Cement Products Co., Inc., Auburn, N. Y., has been granted a charter with a capital of 200 shares no par value common stock. Greene & Greene, 218 Chimes Bldg., Syracuse, N. Y., is agent.

Hitchcock Sand & Gravel, Inc., Queens, N. Y., with a capital of $10,000 has been granted a charter. Jack J. Kaese, 15 Park Row, New York, N. Y., is agent.

Dunklee Sand & Concrete Products Co., Inc., Greenfield, Mass., has been granted a charter with a capital of 300 shares, no par value. Incorporators are Byron J. Whitcomb, William A. Davenport and Nellie R. Nye.

Manufacturers

Caterpillar Tractor Co., Peoria, Ill., has issued its annual report of activities to its 10,000 employees and 18,000 shareholders. The 1938 report goes several steps farther than that for 1937; new charts and drawings have been added to show the facts and figures of the balance sheet and profit and loss statement in graphic form.

Sales in 1938 were $48,246,139.73, a decrease of 23.64 percent compared with 1937.

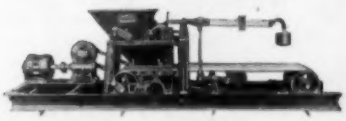
Macwhyte Co., Kenosha, Wis., awarded gold watches and certificates to eighteen employees who have been with the firm for 25 years or longer. The awards were made at the firm's annual family party which culminated a three-day convention of the salesmen of the company.

Hewitt Rubber Corp., Buffalo, N. Y., announces the promotion of James Martin from plant night superintendent to assistant factory manager.

The Jaeger Machine Co., Columbus, O., announces the appointment of R. McLean as manager of its truck mixer division. Mr. McLean recently resigned as executive vice-president of Transit Mixers, Inc.

The Falk Corporation, Milwaukee, Wis., announces that Louis W. Falk has been promoted to executive engineer and W. P. Schmitter to chief engineer of its engineering department.

PROPORTION BY WEIGHT



WITH POIDOMETERS

Many cement plants are using Poidometers for proportioning raw and finish materials, and also cement and hydrated lime for Masons cement. Poidometers are also being used for feeding materials to grinding mills, and coal to dryers.

The Poidometer is self-contained. The scale beam is graduated in pounds or kilos, and can be set at whatever amount of material may be required per foot of belt travel; the gate is then adjusted to suit this weight, and the machine will deliver the pre-determined amount of material with an accuracy of ninety-nine per cent.

Write for Catalog No. 2 and get complete profit-producing facts!

Schaffer Poidometer Co.
2828 Smallman St. PITTSBURGH, PA.

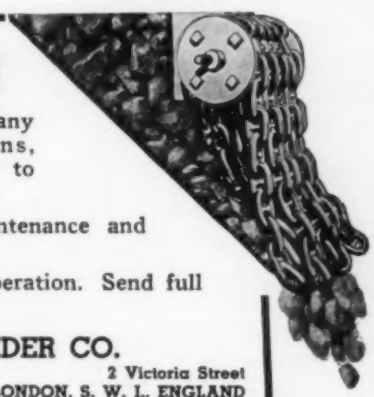
NO OTHER CRUSHER WILL WORK FOR YOU LIKE THIS

DIXIE NON-CLOG Hammermills and Regular Stationary Breakers are unexcelled for primary, secondary or fine reduction. Note the simple, sturdy swing hammer construction and the specially designed, continually moving breaker plate which is an exclusive DIXIE feature. This is an exceptionally powerful and dependable unit for handling cement rock, clay, shale, silica, sand, gypsum, coal, etc. Made in 40 different sizes.

Write for further details.

DIXIE MACHINERY MFG. CO.
4109 Goodfellow Ave. ST. LOUIS, MO.

THE ROSS FEEDER



Completely controls the flow of any size material from Storage Bins, Hoppers or Open-Dump Chutes to Crushers, Conveyors, Screens, etc.

High in efficiency. Low in maintenance and power consumption.

Furnished in sizes to suit your operation. Send full particulars for recommendation.

ROSS SCREEN & FEEDER CO.
19 Rector Street NEW YORK, U. S. A.
2 Victoria Street LONDON, S. W. 1., ENGLAND

Classified Directory of Advertisers

For alphabetical index see page 110

Abrasion Resisting Plates
Frog, Switch & Mfg. Co.
Gilmore Wire Rope Div.
Jones & Laughlin Steel Corp.

Abrasives
Wall-Colmonoy Corp.

Aerial Tramways
American Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bethlehem Steel Co.
Columbia Steel Co. (U. S Steel Corp. Subsi.)
Hazard Wire Rope Co.
Leschen, A., & Sons Rope Co.
Macwhyte Co.
Roebling's, John A., Sons Co.,

Agitators
Blaw, Knox Co.
Hetherington & Berner, Inc.
Ransome Concrete Machinery Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Air Compressors
Allis-Chalmers Mfg. Co.
Fuller Co.
Nordberg Mfg. Co.
F. L. Smidth & Co.
Traylor Engineering & Mfg. Co.

Air Filters
Blaw-Knox Co.
Fuller Co.
Roebling's, John A., Sons Co.,

Air Separators
Blaw-Knox Co.
Combustion Engr. Corp.
Gay, Rupert M. Div.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
Raymond Pulv. Div.
Smidth, F. L., & Co.
Universal Road Machinery Co.
Williams Patent Crusher & Pulv. Co.

Airveyors
Fuller Co.

Alloys (Metal)
Frog, Switch & Mfg. Co.
Wall-Colmonoy Corp.

Ash & Refuse Handling Equipt.
Barber-Greene Co.
Gruendler Crusher & Pulv. Co.
Hetherinton & Berner, Inc.
Link-Belt Co.
Robins Conveying Belt Co.

Asphalt Mixer Regulators
Hetherington & Berner, Inc.

Asphalt Mixing Plants
Hetherington & Berner, Inc.
Koehring Co.
Ransome Concrete Machinery Co.
Traylor Engineering & Mfg. Co.

Axles
Eagle Iron Works

Babbitt Metal
Dixie Machy. Mfg. Co.
Ryerson, Jos. T., & Son, Inc.

Backdiggers
Harnischfeger Corp.
Link-Belt Co.

Backfillers
Austin-Western Road Machy Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Link-Belt Co.

Bag Cleaning Machines
Link-Belt Co.

Bag Ties
American Steel & Wire Co. (U. S. Steel Corp. Susi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Wickwire-Spencer Steel Co.

Bagging Machines
Smidth, F. L., & Co.

Balers or Bundling Machines (Sack)
Besser Mfg. Co.

Balls (Grinding)
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Barges
Eagle Iron Works

Bar & Angle Benders & Cutters
Ransome Concrete Machinery Co.

Batchers, Measuring Volume
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Fuller Company
Jaeger Machine Co
Ransome Concrete Machinery Co.

Bearing Metals
Robins Conveying Belt Co.

Bearings (Anti-Friction)
Chain Belt Co.
Eagle Iron Works
Hetherington & Berner, Inc.
Link-Belt Co.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Sons, Inc.
Timken Roller Bearing Co.

Bearings (Roller and Tapered Roller)
Link Belt Co.
Robins Conveying Belt Co.
Timken Roller Bearing Co.

Bearing (Thrust)
Timken Roller Bearing Co.

Belt Cutters
Flexible Steel Lacing Co.

Belting (Chain)
Chain Belt Co.

Belting (Elevator and Conveyor)
Austin-Western Road Machy. Co.
Bacon, Earle C., Co.
Barber-Greene Co.
Chain Belt Co.
Goodyear Tire & Rubber Co.
Link-Belt Co.
Robins Conveying Belt Co.

Belting (Metal)
Wickwire-Spencer Steel Co.

Belting (Transmission)
Bacon, Earle C., Co.
Goodyear Tire & Rubber Co.
Link-Belt Co.
Smidth, F. L., & Co.

Belting (V Type)
Goodyear Tire & Rubber Co.
Link-Belt Co.

Belting (Wire)
Wickwire-Spencer Steel Co.

Belt Fasteners or Hooks
Flexible Steel Lacing Co.
Robins Conveying Belt Co.

Belt Idlers
Link Belt Co.
Robins Conveying Belt Co.
Smith Engineering Wks.

Belt Lacing
Flexible Steel Lacing Co.

Belt Tighteners
Link-Belt Co.
Robins Conveying Belt Co.

Belt Trippers
Bacon, Earle Co., Inc.
Chain Bet Co.
Link-Belt Co.
Robins Conveying Belt Co.

Bins (Concrete)
Ransome Concrete Machinery Co.

Bin Gates
Austin-Western Road Machy. Co.
Bacon, Earle C., Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Eagle Iron Works
Fuller Co.
Gay, Rupert M. Div.
Gruendler Crusher & Pulv. Co.
Heltzel Steel Form & Iron Co.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jaeger Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Ransome Concrete Machinery Co.
Robins Conveying Belt Co.
Pioneer Engr. Wks., Inc.
Smith Engineering Works
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.
Universal Road Machy. Co.

Bin Indicators
Fuller Co.
Merrick Scale Manufacturing Co.

Bins (Storage)
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Eagle Iron Works
Gay, Rupert M. Div.
Heltzel Steel Form & Iron Co.
Hendrick Mfg. Co.
Hetherington & Berner, Inc.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Works, Inc.
Ransome Concrete Machinery Co.
Robins Conveying Belt Co.
Rogers Iron Works Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.
Universal Crusher Co.
Universal Road Machy. Co.

Blasting Cap Crimpers
Ensign-Bickford Co.

Blasting Supplies
Ensign-Bickford Co.

Block Machines, Building
Anchor Concrete Machinery Co.
Besser Mfg. Co.
Kent Machine Co.
Multiplex Concrete Machy Co.
Zagelmeyer Cast Stone, Block Machy. Co.

Block Racks
Kent Machine Co.

Blocks (Pillow)
American Hoist & Derrick Co.
Chain Belt Co.
Link-Belt Co.
Robins Conveying Belt Co.
Timken Roller Bearing Co.

Blocks (Sheave)
American Hoist & Derrick Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Roebling's, John A., Sons Co.,
Sauerman Bros.

Boats (Self-Unloading)
Link-Belt Co.
Robins Conveying Belt Co.

Boilers
American Hoist & Derrick Co.
Combustion Engineering Corp.

Bond Wire
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)

Brick Machines
Besser Mfg. Co.
Multiplex Concrete Mach. Co.

Buckets (Clamshell, Grab, Orange Peel, etc.)
Blaw-Knox Co.
Bucyrus-Erie Co.
Hayward Company
Harnischfeger Corp.
Industrial Brownhoist Corp.
Jaeger Machine Co.
Link-Belt Co.
Robins Conveying Belt Co.

Buckets (Dragline and Slackline)
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Gruendler Crusher & Pulv. Co.
Harnischfeger Corp.
Hayward Company
Hendrick Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Sauerman Bros., Inc.

Buckets (Dredge & Excavator)
Blaw-Knox Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Hayward Co.

Buckets (Dump)
Brooks Equipt. & Mfg. Co., Inc.
Jaeger Machine Co.

Buckets (Elevator and Conveyor)
Bacon, Earle C., Co.
Brooks Equipt. & Mfg. Co.
Chain Belt Co.
Eagle Iron Works
Gruendler Crusher & Pulv. Co.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jaeger Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Ransome Concrete Machinery Co.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Smith Engr. Wks.
Universal Crusher Co.

Building Tile Machines
Besser Mfg. Co.
Multiplex Concrete Machy. Co

Bulk Cement Batching Plants
Heltzel Steel Form & Iron Co.

Bulk Cement Storage Plants
Blaw-Knox Co.
Heltzel Steel Form & Iron Co.
Link-Belt Co.
Smidth, F. L., & Co.

Bulldozers
Blaw-Knox Co.
Bucyrus-Erie Co.
Koehring Co.

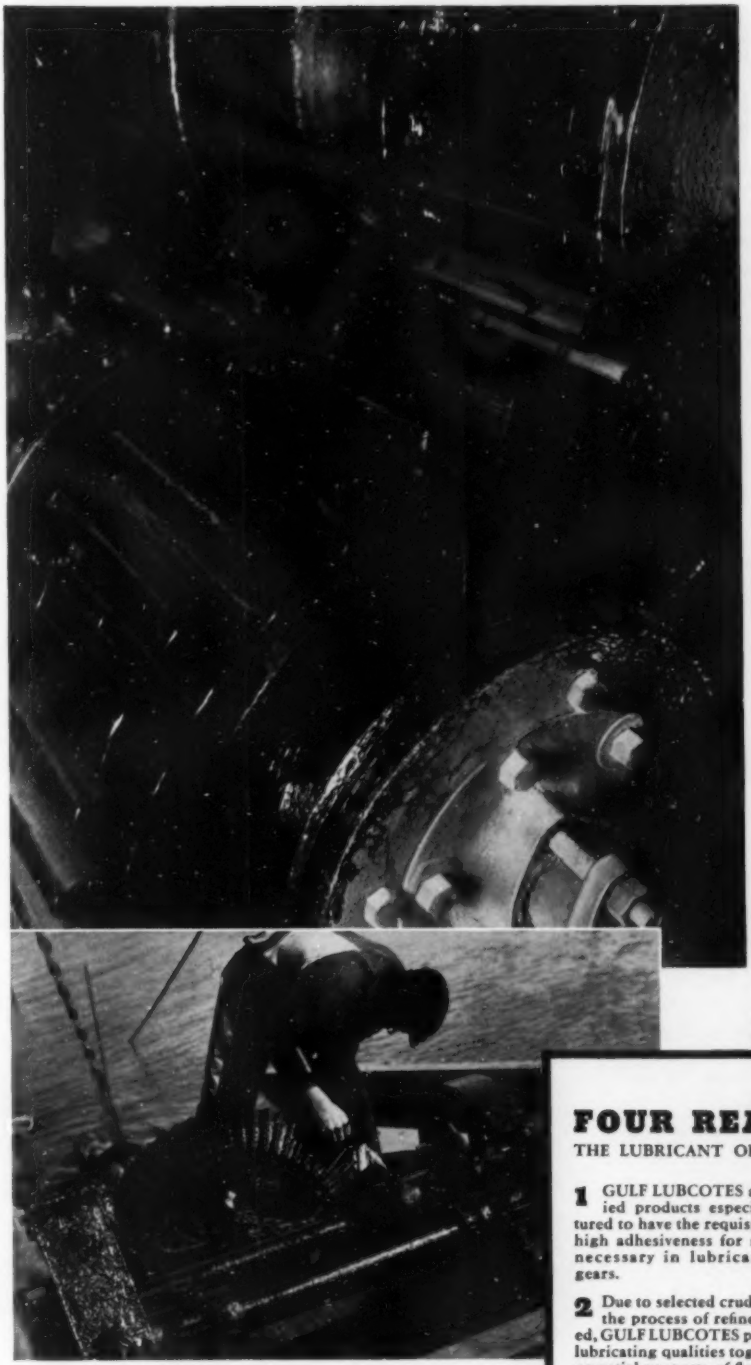
Bullscrapers
Bucyrus-Erie Co.

Bushings
Eagle Iron Wks.
Link-Belt Co.

Cableways
American Cable Co. Inc.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bethlehem Steel Co.
Blaw-Knox Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)

GULF LUBCOTE

Saves Gear Wear!



GULF LUBCOTE is especially adapted to service on gears exposed to the weather, such as shown above.

This tough, tenacious lubricant has remarkable adhesive properties

It stays on! When you apply Gulf Lubcote to open gears you have maximum protection against corrosion, pitting or excessive wear. This heavy-bodied lubricant has great adhesiveness for metal surfaces, yet it is sufficiently mobile to insure proper spreading between sliding surfaces under heavy pressure.

Gulf Lubcote retains its original fluidity and high lubricating qualities to a remarkable degree, resisting heat and decomposition. It is made in seven grades to fit various gear types, open or enclosed, and to provide for a wide range of operating conditions.

Let a Gulf lubrication engineer check over your equipment and recommend the proper application of the right grades of Gulf Lubcote to your gear trains. You will not be obligated in any way.

Gulf Oil Corporation
Gulf Refining Company
GENERAL OFFICES: GULF BUILDING, PITTSBURGH, PA.

GULF INDUSTRIAL LUBRICATION

FOUR REASONS . . . WHY GULF LUBCOTE IS THE LUBRICANT OF UNPARALLELED QUALITY FOR OPEN GEARS

1 GULF LUBCOTES are heavy-bodied products especially manufactured to have the requisite property of high adhesiveness for metal surfaces necessary in lubricants for open gears.

2 Due to selected crudes used and to the process of refinement employed, GULF LUBCOTES possess unusual lubricating qualities together with the essential property of flowing with the movement of the gear and pinion teeth.

3 The lubricating film provided by GULF LUBCOTES, in addition to being impervious to moisture, acid fumes and gases, will withstand extreme temperature changes without deterioration.

4 Due to the tough and tenacious nature of GULF LUBCOTES they will effectively reduce objectionable gear noise and at the same time will provide maximum protection against corrosion, pitting or excessive wear of the gear teeth.

Classified Directory (Cont.)

Gilmore Wire Rope Div.
Hazard Wire Rope Co.
Jones & Laughlin Steel Corp.
Leschen, A., & Sons Rope Co.
Link-Belt Co.
Macwhyte Co.
Roebling's, John A., Sons Co.,
Sauerman Bros.
Wickwire-Spencer Steel Co.

Calcining Equipment
Blaw-Knox Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg Co.

Capstans
Link-Belt Co.
Robins Conveying Belt Co.

Cars (Block, Dump, Industrial, Etc.)
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Bethlehem Steel Co.
Eagle Iron Works
Link-Belt Co.
Multiplex Concrete Mach. Co.
Ransome Concrete Machinery Co.
Sanford Day Iron Works
Traylor Engineering & Mfg. Co.

Car Couplings
Macwhyte Co.

Car Dumps
Eagle Iron Wks.
Link-Belt Co.
Traylor Engr. & Mfg. Co.

Car Pullers & Movers
American Hoist & Derrick Co.
Chain Belt Co.
Gilmore Wire Rope Riv.
Jones & Laughlin Steel Corp.
Link-Belt Co.
Robins Conveying Belt Co.

Car Wheels
Bethlehem Steel Co.
Eagle Iron Wks.
Link-Belt Co.

Carts (Concrete)
Blaw-Knox Co.
Jaeger Machine Co.
Link-Belt Co.
Robins Conveying Belt Co.

Castings
Bethlehem Steel Co.
Bacon, Earle C., Co.
Blaw-Knox Co.
Chain Belt Co.
Dixie Machinery Mfg. Co.
Eagle Iron Works (Grey Iron)
Frog, Switch & Mfg. Co.
Hetherington & Berner, Inc.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Timken Roller Bearing Co.
Wall-Colmonoy Corp.

Cement Plants (Contractor)
Gruendler Crusher & Pulv. Co.
F. L. Smidth & Co.
Traylor Engineering & Mfg. Co.

Cement Colors
Mepham, Geo. S., Corp.
Ricketson Mineral Color Wks.

Cement Process
Cement Process Corp.

Cement Pumps
Fuller Co.
Smidth, F. L., & Co.

Central Mixing Plants (Concrete)
Blaw-Knox Co.
Chain Belt Co.
Heltzel Steel & Iron Co.
Jaeger Machine Co.

Chain (Dredge and Steam Shovel)
Bucyrus-Erie Co.
Chain Belt Co.
Link-Belt Co.

Chain (Elevating and Conveying)
Bacon, Earle C., Co.
Brooks Equipt. & Mfg. Co.
Chain Belt Co.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.

Chimney Block Machines and Molds
Besser Mfg. Co.

Chutes (Bin, Truck, Concrete, Etc.)
Austin-Western Road Machy. Co.
Earl C. Bacon, Inc.
Blaw-Knox Co.
Chain Belt Co.
Cross Engr. Co.
Eagle Iron Works
Fuller Co.
Gruendler Crusher & Pulv. Co.
Hendrick Mfg. Co.
Jaeger Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Ransome Concrete Machinery Co.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg Co.

Chute Liners
Bacon, Earle C., Inc.
Cross Engr. Co.
Frog, Switch & Mfg. Co.
Goodyear Tire & Rubber Co.
Hendrick Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Clarifiers
Chain Belt Co.
Link-Belt Co.

Classifiers
Blaw-Knox Co.
Eagle Iron Works
Link-Belt Co.
Nordberg Manufacturing Co.
Pioneer Engineering Wks., Inc.
Raymond Pulv. Division
Smidth, F. L., & Co.
Simplicity Engr. Co.
Traylor Engineering & Mfg. Co.
Universal Vibr. Screen Co.
Williams Patent Crusher & Pulv. Co.

Clutches
Gruendler Crusher & Pulv. Co.
Link-Belt Co.

Coal Pulverizing Equipment
Austin-Western Road Machy. Co.
Combustion Engineering Corp.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
Pennsylvania Crusher Co.
Raymond Pulv. Division
F. L. Smidth & Co.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Concrete Mixers
Anchor Concrete Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Gruendler Crusher & Pulv. Co.
Jaeger Machine Co.
Kent Machine Co.
Koehring Co.
Multiplex Concrete Machy. Co
Ransome Concrete Machinery Co.

Concrete Reinforcements (Expanded Metal)
Gilmore Wire Rope Div.
Jones & Laughlin Steel Corp.

Conveyors (Apron)
Barber-Greene Co.
Chain Belt Co.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Wickwire-Spencer Steel Co.

Conveyors (Belt)
Austin-Western Road Machy. Co.
Earle C. Bacon
Barber-Greene Co.
Besser Mfg. Co.
Chain Belt Co.
Diamond Iron Wks., Inc.
Fuller Company
Gay, Rupert M. Div.
Gilmore Wire Rope Div.
Gruendler Crusher & Pulv. Co.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jones & Laughlin Steel Corp.
Link-Belt Co.
McLanahan & Stone Corp.
Multiplex Concrete Mach. Co.
Pioneer Engineering Wks., Inc.
Ransome Concrete Machinery Co.
Robins Conveying Belt Co.
Rogers Iron Works Co.
F. L. Smidth & Co.
Smith Engineering Works
Sturtevant Mill Co.
Traylor Engineering & Mfg. Co.
Universal Crusher Co.
Universal Road Machy. Corp.
Wickwire-Spencer Steel Co.
Williams Patent Crusher & Pulv. Co.

Conveyors (Drag-Chain)
Diamond Iron Wks., Inc.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.

Conveyors (Overhead)
Chain Belt Co.

Conveyors (Pan)
Chain Belt Co.
Link-Belt Co.

Conveyors (Pneumatic)
Fuller Company
Gruendler Crusher & Pulv. Co.
Raymond Pulv. Division

Conveyors (Portable)
Austin-Western Road Machy. Co.
Barber-Greene Co.
Diamond Iron Wks., Inc.
Fuller Co.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Universal Crusher Co.

Conveyors (Screw)
Besser Mfg. Co.
Chain Belt Co.
Eagle Iron Works
Gruendler Crusher & Pulv. Co.
Link-Belt Co.

Conveyors (Trolley)
Chain Belt Co.
Link-Belt Co.

Conveyors (Vibrating)
Chain Belt Co.
Link-Belt Co.
Smidth, F. L., & Co.

Conveyor Idlers & Rolls
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Chain Belt Co.
Diamond Iron Wks.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Coolers
Blaw-Knox Co.
Link-Belt Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Coolers (Clinker)
Fuller Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Correcting Basins
F. L. Smidth & Co.

Couplings (Flexible and Shaft)
Chain Belt Co.
Link-Belt Co.
Robins Conveying Belt Co.

Cranes (Diesel Electric Steam, Etc.)
American Hoist & Derrick Co.
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Industrial Brownhoist Corp.
Koehring Co.
Link-Belt Co.
Universal Crusher Co.

Cranes (Overhead Traveling)
Harnischfeger Corp.
Industrial Brownhoist Corp.

Cranes (Tractor)
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Koehring Co.
Link-Belt Co.

Cranes (Truck)
Harnischfeger Corp.

Crawler Attachments
Harnischfeger Corp.
Koehring Co.
Link-Belt Co.

Crawling Tractor Excavators
Austin-Western Road Machy. Co.
Link-Belt Co.

Crusher Parts
American Pulverizer Co.
Bacon, Earle C., Co., Inc.
Dixie Machinery Mfg. Co.
Eagle Iron Works
Frog, Switch & Mfg. Co.
Gruendler Crusher & Pulv Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.

Crushers (Cone)
Nordberg Mfg. Co.

Crushers (Hammer)
American Pulv. Co.
Austin-Western Road Machy. Co.
Brooks Equipment & Mfg. Co.
Dixie Machy. Mfg. Co.
Gruendler Crusher & Pulv. Co.
Pennsylvania Crusher Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Jaw and Gyratory)
Austin-Western Road Machy. Co.
Earle C. Bacon, Inc.
Brooks Equipment Mfg. Co.
Diamond Iron Wks., Inc.
Dixie Machinery Mfg. Co.
Gay, Rupert M. Div.
Gruendler Crusher & Pulv. Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Rogers Iron Works Co.
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Universal Crusher Co.
Universal Road Machy. Corp.
Williams Patent Crusher & Pulv. Co.

Crushers (Laboratory)
American Pulverizer Co.
Bacon, Earle C., Co.
Dixie Machinery Mfg. Co.
Gruendler Crusher & Pulv. Co.
Pennsylvania Crusher Co.
Traylor Engineering & Mfg. Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Primary Breakers)
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

THE UNBEATABLE COMBINATION

INDUSTRIAL BROWNHOIST

GENERAL OFFICES: BAY CITY, MICHIGAN

DISTRICT OFFICES

New York, Philadelphia, Pittsburgh, Cleveland, Chicago, Agents in Other Principal Cities

Industrial Brownhoist and Diesel Power

Crane owners who think they are money ahead by "getting along" with their present equipment just aren't familiar with the new Industrial Brownhoist models. Here are a few facts about them worth considering.

The new Industrial Brownhoist Diesel cranes are more ruggedly built and are averaging 20% bigger output per day at a saving of 20% to 40% in fuel costs over the cranes they replaced. The Diesel, moreover, is one-man operated and has more speed and power for switching service than most plants ever require.

With business looking up and more work to do, now is a good time to bring down handling costs. Compare your present figures with those of some Industrial Brownhoist Diesel owners who are using their cranes for work similar to yours. We will be glad to give you this data and complete information on the right size crane for your plant.

BUYERS' FREE SERVICE

RESEARCH SERVICE DEPARTMENT, *Rock Products*, 205 W. Wacker Drive, Chicago, Ill.
We are in the market for and would like to receive prices and literature on the items checked below:

....Admixtures
....Aerial Tramways
....Aggregates (Special)
....Agitators
....Air Compressors
....Air Separators
....Architectural Trimstone Molds
....Ash Receptacle Molds
....Ash & Refuse Handling Equipment
....Asphalt Mixing Plants
....Backdiggers
....Backfillers
....Bags
....Bagging Machines
....Balls (Grinding)
....Barges
....Batchers (Weighing)
....Bearings
....Belting (Conveyor & Elevator)
....Bins (Storage)
....Blasting Supplies
....Block Machines, Building
....Boats
....Brick Machines & Molds
....Buckets
....Building Tile Machines
....Bulk Cement Batching Plants
....Bulk Cement Storage Plants
....Bulldozers
....Bullscrapers
....Burial Vault Forms
....Calcining Equipment
....Calcium Chloride
....Cars (Industrial)
....Catch Basin Block Machines
....Cement Plants
....Cement Colors
....Cement Process
....Central Mixing Plants (Concrete)
....Chimney Block Machines & Molds
....Clarifiers
....Classifiers
....Coal Pulverizing Equipment
....Concentrators
....Concrete Mixers
....Concrete Paints & Coatings
....Concrete Waterproofing & Dampproofing
....Conveyors
....Conveyor Idlers and Rolls
....Coolers
....Corn Crib Block and Tile Machines
....Correcting Basins
....Cranes (Crawler & Locomotive)
....Crushers
....Crushing & Screening Plants (Portable)
....Culvert Pipe Machines & Molds (Concrete)
....Curing Equipment
....Curb Forms (Concrete)
....Dedusters
....Dehydrators
....Derricks
....Dewatering Equipment
....Dippers & Teeth
....Disintegrators
....Dragline Cableway Excavators
....Drain Tile Machines
....Dredges
....Dredge Pumps
....Drills (Rock)
....Drill Bits
....Drill Sharpening Machines
....Drill Steel
....Dryers
....Dust Collecting Systems
....Dust Precipitators
....Dust Recovery Plants
....Dynamite
....Electric Motors
....Electrostatic Separators
....Elevators
....Engineering Service (Consulting & Designing)
....Engines (Diesel, Gasoline, Steam)
....Feeders
....Fence Post Molds & Machines (Concrete)
....Floor Tile Machines (Concrete)
....Garbage Receptacle Molds (Concrete)
....Garden Furniture Molds (Concrete)
....Generators & Motor Generator Sets
....Greenhouse Bench Forms (Concrete)
....Guns (Hydraulic)
....Gutter Block Machines (Concrete)
....Hoists
....Hoppers
....Hose
....Hydrators (Lime)
....Joist & Slab Machines (Concrete)
....Kilns (Rotary, Shaft, Vertical)
....Laboratory Apparatus
....Laundry Tub Molds (Concrete)
....Light Post & Standard Forms
....Lime (Hydrated)
....Lime Handling Equipment
....Lime Plants
....Lime Putty Plants
....Loaders
....Locomotives
....Mills (Ball, Compartment, Emery, Hammer, Rod, Roll, Tube)
....Mortar Mixers
....Pallets (Steel, Wood)
....Pans, Grinding (Wet & Dry)
....Perforated Metal
....Pipe Molds and Machines (Concrete)
....Pipe
....Plaster Mixers
....Pontoons
....Pulverizers
....Pumps (Pulverized Material)
....Railway Equipment
....Rectifiers
....Recuperators
....Refractories
....Rewashers (Screw)
....Rock Wool Cupolas
....Roofing Tile Machines
....Sand Drags
....Sand & Gravel Plants
....Sand Lime Brick Machinery
....Sand Settling Tanks
....Scales
....Scrapers (Power Drag)
....Screens (Revolving, Vibrating, Etc.)
....Seal Rings
....Septic Tank Molds (Concrete)
....Sewer Pipe Machines (Concrete)
....Shale Planers
....Shovels (Power)
....Sidewalk Forms
....Sill Forms (Concrete)
....Silos (Storage)
....Silo Stave Machines
....Slakers (Rotary)
....Slurry Mixers
....Slurry Pumps
....Slurry Separators
....Slurry Thickeners
....Step Forms (Concrete)
....Tampers (Hand & Power)
....Tanks (Storage)
....Tractors
....Trucks (Agitator)
....Trucks (Dump)
....Trucks (Industrial)
....Trucks (Mixer Body)
....Unloaders
....Unloaders (Boat)
....Unloaders (Box Car)
....Wagons (Dump)
....Wall Forms & Machines (Concrete)
....Washers (Sand, Gravel & Stone)
....Welding & Cutting Equipment
....Well Curbing Machine & Molds (Concrete)
....Wire Cloth
....Wire (Copper, Iron & Steel)
....Wire Rope

Firm Name _____ *Title* _____
Individual _____
Address _____
City _____ *State* _____

LOOKING FOR PROFIT

THE GREATEST PROFIT in any business lies in the largest volume of sales with the lowest selling costs.

This is especially true in the rock products industry where the number of prospects for your equipment is relatively small. A few large sales will return a far greater profit than a large number of small ones. So, if you're attempting to sell to the rich rock products market you would do well to look below the surface.

In all the claims and counter-claims made for one or another of the advertising mediums which go to producers of cement, crushed stone, lime, sand and gravel, slag, gypsum, ready-mixed concrete, concrete products, or any of the other branches of this major industry, one fact stands out with crystal clarity. It is simply this:

All types of equipment—low-priced, medium priced or high priced—sell fastest in that portion of the market which has the highest purchasing power.

ROCK PRODUCTS is your logical medium for reaching this preferred market. It—and it alone—can give you the concentration of purchasing power which makes for volume business and lowest selling costs. Ask us to prove it to you.

ROCK PRODUCTS

205 WEST WACKER DRIVE
CHICAGO, ILLINOIS

Classified Directory (Cont.)

Crushers (Reduction)
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.

Crushers (Ring)
American Pulverizer Co.
Dixie Machinery Mfg. Co.
Gruendler Crusher & Pulv. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Roll)
American Pulverizer Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Co.
Besser Mfg. Co.
Brooks Equipment & Mfg. Co.
Diamond Iron Wks., Inc.
Eagle Iron Works
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Rogers Iron Works Co.
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Crushing Rolls
Austin-Western Road Machy. Co.
Diamond Iron Wks., Inc.
Eagle Iron Wks.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Rogers Iron Works Co.
Traylor Engineering & Mfg. Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Crushing and Screening Plants (Portable)
American Pulverizer Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Blaw-Knox Co.
Brooks Equipment & Mfg. Co.
Diamond Iron Wks., Inc.
Dixie Machinery Mfg. Co.
Eagle Iron Works
Gruendler Crusher & Pulv. Co.
Heltzel Steel Form & Iron Co.
Link-Belt Co.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Rogers Iron Works Co.
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Tyler, W. S. Co.
Universal Crusher Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Curing Racks
Besser Mfg. Co.
Multiplex Concrete Machy. Co.

Decks, Vibrating Screen
Hendrick Mfg. Co.

Dedusters
Blaw-Knox Co.

Dehydrators
Pioneer Engineering Wks., Inc.

Derricks
American Hoist & Derrick Co.
Harnischfeger Corp.
Hayward Company

Detonators
Ensign-Bickford Co.

Dewatering Machines
Chain Belt Co.
Diamond Iron Wks., Inc.
Eagle Iron Wks.
Jaeger Machine Co.
Link-Belt Co.

Diaphragms (Rubber)
Jaeger Machine Co.

Dippers & Teeth (Dredge & Shovel
Bucyrus-Erie Co.
Frog, Switch & Mfg. Co.
Harnischfeger Corp.
Koehring Co.
Link-Belt Co.

Disentegrators
Smidth, F. L., & Co.

Ditchers
Barber-Greene Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Link-Belt Co.

Dragline & Cableway Excavators
American Cable Co.
American Hoist & Derrick Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Austin-Western Road Machy Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Diamond Iron Wks., Inc.
Harnischfeger Corp.
Hazard Wire Rope Co.
Koehring Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Sauerman Bros., Inc.
Wickwire-Spencer Steel Co.

Dredges
American Hoist & Derrick Co.
Bucyrus-Erie Co.
Eagle Iron Works
Hayward Co.
Hetherington & Berner, Inc (Complete Steel)
Link-Belt Co.

Dredge Cutter Heads & Ladders
Bucyrus-Erie Co.
Eagle Iron Wks.
Hetherington & Berner, Inc.

Dredge Hulls
Eagle Iron Wks.

Dredging Sleeves
Hetherington & Berner, Inc.

Drills (Blast Hole)
Bucyrus-Erie Co.

Drills (Rock)
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drills (Well)
Bucyrus-Erie Co.

Drill Bits
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drill Sharpening Machines
Bucyrus-Erie Co.

Drill Steel
Bethlehem Steel Co.

Drilling Accessories
Bucyrus-Erie Co.
Timken Roller Bearing Co.

"THEY WON'T BUY CONCRETE MATERIALS FROM US— THEY WANT READY-MIXED"

BEFORE THIS HAPPENS TO YOU—CHECK UP ON THE REX FOUR-PROFIT PLAN!

Many a building supply dealer knows what it is to lose money-making orders for sand, stone and cement, because of the general trend towards the used of ready-mixed concrete. Before this happens to you, investigate the Rex *"Four Profit Plan"* for building supply dealers — see how others are meeting the same problem and making money at it! Find out how, in mixing, transporting and placing Moto-Mixed concrete you can make profits simultaneously on sand, stone, cement and concrete—See how you can start to double or triple your yearly volume of sales to the fast growing list of ready-mixed users.

SEND FOR NEW CATALOG!

"This Year and Every Year" is a new book which gives a complete and detailed resume of the many exclusive features you get in Rex Moto-Mixers—*features that mean more yards mixed per dollar invested!* Address the Chain Belt Company, 1649 W. Bruce Street, Milwaukee, Wisconsin.

REX MOTO-MIXERS

STA-TRU
Long-Mesh
Woven Wire Screens

made to work under tension and vibration.

The straight stay-bars carry ALL the tension. The crimps in the round wires can not be stretched or broken. The screen can not be caused to sag or split by the pull of the tensioning device.

LUDLOW-SAYLOR
WIRE CO. ST. LOUIS

Imposing figures, aren't they? These are the actual savings made by the Brooks Load-Lugger on many hand loading operations . . . cost cutting news for any man's pocketbook! You, too, should profit from the Lugger's continuous operation . . . save on its curtailing of investment in needless trucks. For the Brooks Load-Lugger and 4 to 8 buckets may replace several trucks . . . operate at a faster speed than any other equipment used on hand loading operations. Send for the economy story today! Demonstrations arranged in most sections.

BROOKS EQUIPMENT & MFG. CO.
84 Davenport Road, Knoxville, Tenn.

Classified Directory (Cont.)

Drives (Belt, Chain and Rope)
Bacon, Earle C., Co.
Chain Belt Co.
Diamond Iron Works, Inc.
Link-Belt Co.
Smidth, F. L., & Co.

Drives (Short Center)
Earle C. Bacon, Inc.
Chain Belt Co.
Link-Belt Co.
Smidth, F. L., & Co.

Drives (Worm)
Link-Belt Co.

Dryers
Blaw-Knox Co.
Combustion Engineering Corp.
Gruendler Crusher & Pulv. Co.
Hetherington & Berner, Inc.
Link-Belt Co.
McLanahan & Stone Corp.
Raymond Pulv. Division
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.
Tyler, W. S., Co.
Williams Patent Crusher & Pulv. Co.

Dust Arrestors
Blaw-Knox Co.

Dust Collector Bags
Blaw-Knox Co.

Dust Collecting Systems
Blaw-Knox Co.
Buell Engineering Co., Inc.
Hendrick Mfg. Co.
Raymond Pulv. Division
Smidth, F. L., & Co.

Dust Conveying Systems
Blaw-Knox Co.
Fuller Company
Raymond Pulv. Division

Electric Motors
Harnischfeger Corp.
Hayward Co.

Elevators
Austin-Western Road Machy. Co.
Bacon, Earle C., Co.
Barber-Greene Co.
Besser Mfg. Co.
Chain Belt Co.
Cross Engineering Co.
Diamond Iron Wks., Inc.
Eagle Iron Works
Fuller Company
Gay, Rupert M. Div.
Gruendler Crusher & Pulv. Co.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jaeger Machine Co.
Kent Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Multiplex Concrete Mach. Co.
Pioneer Engineering Wks., Inc.
Ransome Concrete Machinery Co.
Robins Conveying Belt Co.
Rogers Iron Works Co.
Smidth, F. L., & Co.
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Universal Crusher Co.
Universal Road Machinery Co.
Williams Patent Crusher & Pulv. Co.

Engineers (Designing & Consulting)
Bacon, Earle C., Co.
Blaw-Knox Co.
Fuller Co.
Gruendler Crusher & Pulv. Co.
Hetherington & Berner, Inc.
Link-Belt Co.
McLanahan & Stone Corp.
Merrick Scale Manufacturing Co.
Productive Equipment Corp.
Robins Conveying Belt Co.
Rogers Iron Works Co.
F. L. Smidth & Co.
Traylor Engineering & Mfg Co.
Williams Patent Crusher & Pulv. Co.

Engines (Diesel, Gasoline, Kerosene and Oil)
American Hoist & Derrick Co.
Nordberg Mfg. Co.

Engines (Steam)
American Hoist & Derrick Co.
Nordberg Mfg. Co.

Exhausters
Combustion Engineering Corp.
Raymond Pulv. Div.

Fans (Exhaust & Ventilating)
Blaw-Knox Co.
Gruendler Crusher & Puv. Co.
Smidth, F. L., & Co.

Feeders
Earle C Bacon, Inc.
Barber-Greene Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Diamond Iron Wks., Inc.
Fuller Co.
Gay, Rupert M. Div.
Gruendler Crusher & Pulv. Co.
Hetherington & Berner, Inc.
Kent Machine Co.
Link-Belt Co.
Merrick Scale Manufacturing Co.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Schaffer Poidometer Co.
Smidth, F. L., & Co.
Smith Engr. Wks.
Traylor Engineering & Mfg. Co.
Universal Crusher Co.
Universal Road Machinery Co.

Filter Cloth
Roebling's, John A., Sons Co.,
Tyler, W. S., Co.
Wickwire-Spencer Steel Co.

Finished Cement Grinding Aid
Dewey & Almy Chemical Co.

Forgings
Bacon, Earle C., Co.

Frogs & Switches
Frog, Switch & Mfg. Co.

Fuels (Diesel)
Texas Co.

Fuses (Detonating and Safety)
Ensign-Bickford Co.

Fuse Cutters
Ensign-Bickford Co.

Fuse Lighters
Ensign-Bickford Co.

Gaskets
Goodyear Tire & Rubber Co.

Gasoline
Gulf Refining Co.
Texas Company

Gas Producers
Blaw-Knox Co.

Gears
Bacon, Earle C., Co.
Chain Belt Co.
Diamond Iron Wks., Inc.
Frog, Switch & Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Traylor Engineering & Mfg. Co.

Gear-Motors
Link-Belt Co.

Generators & Motor Generator Sets
Harnischfeger Corp.
Nordberg Mfg. Co.

Grapples
Blaw-Knox Co.
Bucyrus-Erie Co.
Hayward Co.

Grating
Blaw-Knox Co.
Eagle Iron Wks.
Hendrick Mfg. Co.

Grease
Bacon, Earle C., Co.
Gulf Refining Co.
Texas Company

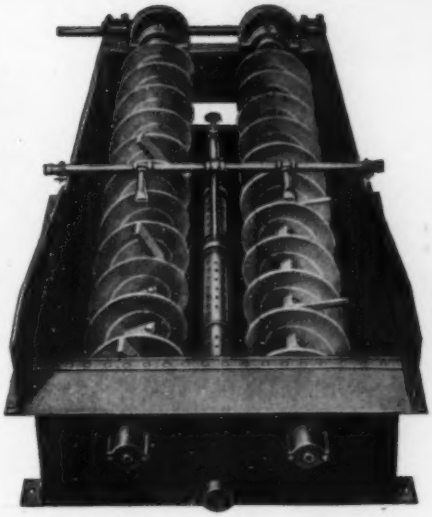
An Insurance Policy on Wheels...
THE LIMA SHAY

When you haul with a Lima Shay Geared Locomotive you are insuring yourself against slow-ups in production caused by slipping, stalling on tough curves and grades, or derailments.

The Shay is designed to haul maximum pay-loads quickly and economically. Its simple construction, with all parts readily accessible, facilitates the job of lubrication, adjustment, or repairs. Investigate fully the possibilities of Shay Power in your quarry.

LIMA LOCOMOTIVE WORKS, Incorporated
LIMA, OHIO
Sales Office: 60 E. 42nd St., New York, N. Y.

...THE RIGHT WASHER TO... REDUCE YOUR COSTS



This DOUBLE SPIRAL SCREW WASHER is specifically designed to deliver a finished product of the finest quality at the lowest operating costs. They thoroughly scrub the aggregate—removing all mud, sticks, leaves, silt, coal, shale and clay balls.

All EAGLE WASHERS are built of the highest quality material and are designed for extremely high efficiency, low operating costs, large capacity and long life.

Write for complete details about the EAGLE SPIRAL SCREW WASHER, THE EAGLE PADDLE LOG WASHER AND THE "SWINTEK" SCREEN NOZZLE LADDER.

EAGLE IRON WORKS
DES MOINES IOWA • • •

STOP To consider the many advantages gained by installing Simplicity Gyrating Screens.

To check the many features of the Simplicity Gyrating Screen; such as the solid counter-balanced shaft; resilient corner supports, double crowned screen decks, and many others.

LOOK At the many successful installations of Simplicity Gyrating Screens and observe their capacity and screening efficiency.

At the finished details of construction where nothing has been omitted to make the Simplicity Gyrating Screen a complete job.

AND LISTEN To all arguments pro and con; then buy the screen with the lowest ultimate cost per ton of material handled, which will be the Simplicity Gyrating Screen.

SIMPLICITY ENGINEERING CO.
DURAND MICHIGAN

Sauerman Scraper above handles the storing and reclaiming of 120,000 tons of crushed stone per season at a cement mill at a cost of only a few cents per ton.

DIG and HAUL ..at low cost

The first cost of a Sauerman Slackline or Drag Scraper machine for the average long haul job is less than the cost of any other equipment that will *dig, haul and place* an equal yardage of materials. Moreover, a Sauerman machine is easy to operate and demands little by way of repairs, assuring a minimum daily expense.

Whether your problem is to dig gravel from a deep pit, high bank or river, or to convey loose rock from quarry to crusher, or to stockpile and reclaim surplus products—there is a type and size of Sauerman machine to meet your needs.

Write for our catalog or tell us about your problem and our engineers will give you their suggestions.

Crescent scraper bucket is a powerful excavator and a rapid conveyor.

SAUERMAN BROS., INC.
430 S. CLINTON ST. CHICAGO, ILL.

Sauerman Cableway, operated by one man, handles 1,000 tons of gravel per day from river-bar to plant.

Classified Directory (Cont.)

Grease Cups
Link-Belt Co.
Robins Conveying Belt Co.

Grinding Aids
Dewey & Almy Chemical Co.

Guards (Lamp)
Flexible Steel Lacing Co.

Guards (Machinery)
Harrington & King Perforating Co.
Hendrick Mfg. Co.
Tyler, W. S., Co.

Guns (Hydraulic & Spray)
Hetherington & Berner, Inc.

Gypsum Plants
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
Traylor Engr. & Mfg. Co.

Haulage Systems (Remote Control)
Koehring Co.

Hoists (Chain, Electric, Portable, Skip, Etc.)
American Hoist & Derrick Co.
Besser Mfg. Co.
Chain Belt Co.
Commercial Shearing & Stamping Co.
Diamond Iron Wks., Inc.
Eagle Iron Works
Gay, Rupert M. Div.
Gruendler Crusher & Pulv. Co.
Harnischfeger Corp.
Hetherington & Berner, Inc.
Jaeger Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Sauerman Bros., Inc.
Smith Engr. Wks.
Traylor Engineering & Mfg. Co.
Universal Road Machinery Co.

Hoppers
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Gay, Rupert M. Div.
Gruendler Crusher & Pulv. Co.
Heltzel Steel Form & Iron Co.
Hendrick Mfg. Co.
Jaeger Machine Co.
Link-Belt Co.
Merrick Scale Manufacturing Co.
Pioneer Engineering Wks., Inc.
Ransome Concrete Machinery Co.
Robins Conveying Belt Co.
Rogers Iron Works Co.
Traylor Engineering & Mfg. Co.
Universal Road Machinery Co.

Hose (Water, Steam, Air Drill, Pneumatic, Sand Suction and Discharge)
Dixie Machinery Mfg. Co.
Goodyear Tire & Rubber Co.
Hetherington & Berner, Inc.
Jaeger Machine Co.

Hydrators (Lime)
Blaw-Knox Co.
Traylor Engr. & Mfg. Co.

Jigs (Sand and Gravel)
Traylor Engineering & Mfg. Co.

Joists & Slab Machines (Concrete)
Besser Mfg. Co.

Kilns Parts
Blaw-Knox Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Kilns (Rotary)
Blaw-Knox Co.
F. L. Smidth & Co.
Traylor Engineering & Mfg. Co.

Kilns (Vertical)
Blaw-Knox Co.

Kiln Burners
Smidth, F. L., & Co.

Kiln Chain Systems
Smidth, F. L., & Co.

Kiln Liners (Metal)
Traylor Engr. & Mfg. Co.

Kominuters
Smidth, F. L., & Co.
Ransome Concrete Machinery Co.

Laboratory Apparatus
Smidth, F. L., & Co.
Ransome Concrete Machy. Co.

Lift Trucks
Besser Mfg. Co.

Light Plants
Harnischfeger Corp.

Lime Handling Equipment
Combustion Engineering Corp.
Fuller Co.
Link-Belt Co.
Raymond Pulv. Division
Robins Conveying Belt Co.
Traylor Engineering & Mfg. Co.

Lime Plants
American Pulverizer Co.
Blaw-Knox Co.
Gruendler Crusher & Pulv. Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Loaders (Bin, Car, Hopper, Truck, Etc.)
Barber-Greene Co.
Besser Mfg. Co.
Bucyrus-Erie Co.
Chain Belt Co.
Diamond Iron Wks., Inc.
Fuller Company
Gay, Rupert M. Div.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
Robins Conveying Belt
Ross Screen & Feeder Co.
Universal Crusher Co.
Universal Road Machinery Co.

Loaders (Boat)
Chain Belt Co.
Fuller Co.
Link-Belt Co.

Loaders (Box Car)
Barber-Greene Co.
Chain Belt Co.
Diamond Iron Wks., Inc.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.

Loaders (Underground)
Bucyrus-Erie Co.
Diamond Iron Wks., Inc.
Nordberg Mfg. Co.

Locomotives (Diesel & Diesel-Electric
Lima Locomotive Works, Inc. (Loco. Div.)

Locomotives (Electric, Trolley & Storage Battery)
Lima Locomotive Works, Inc. (Loco. Div.)

Locomotives (Gasoline & Gas-Electric)
Lima Locomotive Works, Inc. (Loco. Div.)

Locomotive (Kerosene)
Lima Locomotive Works, Inc. Loco. Div.)

Locomotives (Oil & Oil Electric)
Lima Locomotive Works, Inc. (Loco. Div.)

Locomotives (Steam)
Lima Locomotive Works, Inc (Loco. Div.)

Locomotive Stack Netting
Tyler, W. S., Co.

Lubricants
Bacon, Earle C., Inc.
Gulf Refining Co.
Robins Conveying Belt Co.
Texas Co,

Machine Shop Equipment
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Here are 3 advantages...
THERE ARE OTHERS

For shaking and vibrating screens, Hendrick Perforated Plate offers a number of genuine advantages, among them—

1—a variety of openings—round, square, hexagonal, slotted, "Squaround" or special perforations as required.

2—single corrugations or double corrugations; flat or rolled to any curvature.

3—availability in a wide variety of metals, particularly Hendrick high carbon, heat treated steel.

If you are not now using perforated plate on your vibrating screens, write for a copy of our handbook on perforated plate for vibrating screens.

HENDRICK MANUFACTURING CO.

47 Dundaff St., Carbondale, Pa.

SALES OFFICES IN PRINCIPAL CITIES
PLEASE CONSULT TELEPHONE DIRECTORY

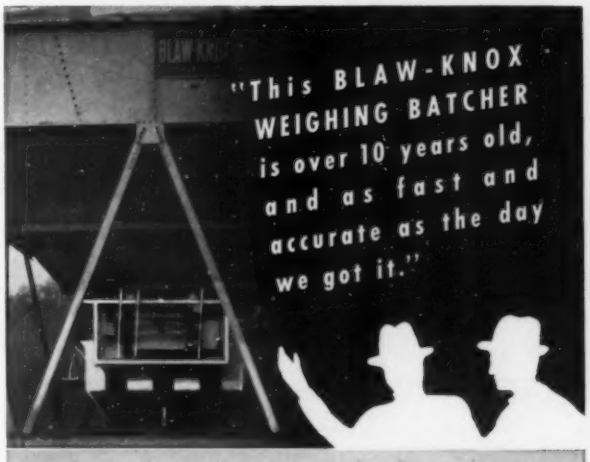
Makers of Elevator Buckets of all types, Mitco Open Steel Flooring, Mitco Shur-Site Treads and Mitco Armorgrids, Light and Heavy Steel Plate Construction.

AMERICAN
FOR LOWEST CRUSHING COSTS

AMERICAN CRUSHERS are designed to produce a superior product, with the lowest operating costs. Carefully selected and tested parts assure long life, trouble-free performance and low power requirements. Operators everywhere have found that AMERICANS will stay right on the toughest crushing job day after day delivering maximum tonnage per hour. Next time you purchase a crusher be sure it's an AMERICAN and watch your costs go down.

Write for complete catalog today.

AMERICAN PULVERIZER CO. 1245 Macklind Avenue ST. LOUIS, MO.



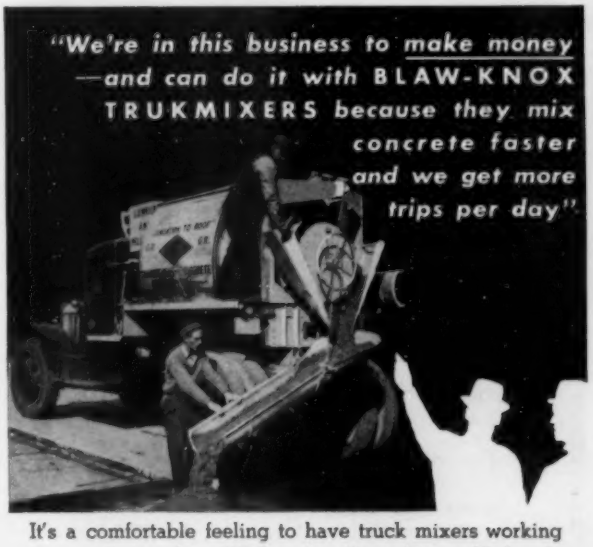
Built for maximum speed and accuracy in measuring AGGREGATES, CEMENT AND WATER, Blaw-Knox Weighing Batchers are standard equipment in widespread use by road contractors, for general construction, material yards, and ready mixed concrete plants. They satisfy all modern specifications. Furnished for manual or automatic operation.

The reliability of Blaw-Knox Weighing Batchers is acknowledged by thousands of users. Send for catalog No. 1566.

18

BLAW-KNOX BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.

Weighing Batchers


"We're in this business to make money —and can do it with BLAW-KNOX TRUKMIXERS because they mix concrete faster and we get more trips per day."

It's a comfortable feeling to have truck mixers working for you that perform 100% under all conditions. No breakdowns—no worries.

You make a *profitable investment* when you buy Blaw-Knox Trukmixers and agitators.

24

BLAW-KNOX BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.

Agitators and **TRUKMIXERS**

ROGERS ARE GOOD SUPER-CAPACITY CRUSHERS

CRUSHING PLANTS

STATIONARY
PORTABLE
SEMI-PORTABLE
CRUSHED STONE OR GRAVEL

(50 tons to 3000 tons per day.)

10"x36" Anti-Friction Bearing Crusher

JAW CRUSHERS

Bronze or Anti-Friction Bearings—Sizes 5"x6" to 15"x24"

Anti-Friction Bearings Only —Sizes 15"x36" to 24"x40"

CRUSHER BUILDERS FOR 40 YEARS

ROGERS IRON WORKS CO.

Write for Bulletins Nos. 303 or 304

Give us details of your crushing problem

300 10th STREET JOPLIN, MO.

PRODUCE HIGH EARLY STRENGTH

Normal, general-purpose, masonry, plastering and stuccoing cements under the several BLANK patented processes.

●

Inquiries invited from producers of cement, lime and allied products.

Patents issued and pending in the United States, Canada, and in leading Central and South American and European Countries.

Investigations and experimental tests carried out at plants of interested producers by technical experts familiar with processes at no cost to producer.

Our booklet No. 1 will be sent interested parties on request.

CEMENT PROCESS CORP.

John A. Blank, Chemical Engr.,
Cement & Lime Plants Division,
710 So. 6th St., Ironton, Ohio

MAIN OFFICE
90 Broad Street
New York

MEXICAN BRANCH
P.O. Box 515, Mexico City, Mexico

Classified Directory (Cont.)

Magnetic Separators
Diamond Iron Wks., Inc.
Link-Belt Co.
Robins Conveying Belt Co.

Manganese Steel Parts
Bacon, Earle C., Inc.
Dixie Mach. Mfg. Co.
Frog, Switch & Mfg. Co.

Material Handling Equipment
Austin-Western Road Machy. Co.
Barber-Greene Co.
Chain Belt Co.
Diamond Iron Wks., Inc.
Fuller Company
Gruendler Crusher & Pulv. Co.
Harnischfeger Corp.
Heltzel Steel Form & Iron Co.
Link-Belt Co.
Raymond Pulv. Division
Robins Conveying Belt Co.

Measuring Devices
Blaw-Knox Co.
Fuller Co.
Heltzel Steel Form & Iron Co.
Jaeger Machine Co.
Schaffer Poidometer Co.

Mechanical Rubber Goods
Goodyear Tire & Rubber Co.

Mill Parts
Blaw-Knox Co.
Gruendler Crusher & Pulv. Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Mills, Grinding (Ball, Tube, Hammer, Rod, Roll, Etc.) (See also Pulverizers)
American Pulverizer Co.
Brooks Equipment & Mfg. Co.
Combustion Engineering Corp.
Dixie Machinery Mfg. Co.
Gruendler Crusher & Pulv. Co.
Pennsylvania Crusher Co.
Raymond Pulv. Division
F. L. Smidth & Co.
Traylor Engineering & Mfg. Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Mill Liners
Dixie Machy. Mfg. Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Mortar Colors
Mepham, Geo. S., Corp.
Ricketsen Mineral Color Wks.

Mortar Mixers
Chain Belt Co.
Eagle Iron Works
Gruendler Crusher & Pulv. Co.
Jaeger Machine Co.
Ransome Concrete Machinery Co.

Nails
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbus Steel Co. (U. S. Steel Corp., Subsi.)

Nozzles (Gravel Washing)
Chain Belt Co.
Link-Belt Co.

Nuts
Bethlehem Steel Co.

Oil Burners
Smidth, F. L., & Co.

Oils (Lubricating)
Bacon, Earle C., Inc.
Gulf Refining Co.
Robins Conveying Belt Co.
The Texas Co.

Oils (Cutting)
The Texas Co.

Ornamental Forms (Concrete)
Besser Mfg. Co.

Packing
Goodyear Tire & Rubber Co.

Pallets
Anchor Concrete Machinery Co.
Bacon, Earle C., Inc.
Besser Mfg. Co.
Commercial Shearing and Stamping Co.
Multiplex Concrete Machy Co.

Pans, Grinding (Wet & Dry)
Eagle Iron Works
Traylor Engineering & Mfg. Co.

Perforated Metal
Bacon, Earle C., Inc.
Chicago Perforating Co.
Cross Engineering Co.
Gruendler Crusher & Pulv. Co.
Harrington & King Perf. Co.
Hendrick Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Joseph T. Ryerson & Son, Inc.
Standard Stamping & Perforating Co.
Traylor Engr. & Mfg. Co.
Wickwire-Spencer Steel Co.

Perforated Screen Plates & Cloth—See Screen Cloth & Plates

Pinions
Bacon, Earle C., Inc.
Chain Belt Co.
Frog, Switch & Mfg. Co.
Link-Belt Co.

Pipe Molds and Machines (Concrete)
Besser Mfg. Co.
Universal Concrete Pipe Co.

Pipe
Bethlehem Steel Co.
Frog, Switch & Mfg. Co.
Hetherington & Berner, Inc.
Naylor Pipe Co.

Pipe Fittings
Hetherington & Berner, Inc.
Naylor Pipe Co.

Pipe Forms & Machines (Concrete)
Universal Concrete Pipe Co.

Plaster Colors
Mepham, Geo. S., Corp.

Plaster Mixers
Eagle Iron Works
Gruendler Crusher & Pulv. Co.
Jaeger Machine Co.
Ransome Concrete Machinery Co.

Plaster Plants
Koehring Co.

Poidometers
Schaffer Poidometer Co.

Pontoons
Diamond Iron Wks., Inc.
Eagle Iron Works

Power Transmission Machinery
Chain Belt Co.
Diamond Iron Wks., Inc.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Timken Roller Bearing Co.

Power Units
Nordberg Mfg. Co.

Pulleys
Bacon, Earle C., Inc.
Chain Belt Co.
Diamond Iron Wks., Inc.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Pulverizer Parts
American Pulverizer Co.
Dixie Machinery Mfg. Co.
Frog, Switch & Mfg. Co.
Gruendler Crusher & Pulv. Co.
Smidth, F. L., & Co.

Pulverizers (Hammer, Ring, Rod & Roll) (See Also Mills & Crushers)
American Pulverizer Co.

Classified Directory (Cont.)

Austin-Western Road Machy. Co.
Blaw-Knox Co.
Brooks Equipment & Mfg. Co.
Combustion Engineering Corp.
Dixie Machy. Mfg. Co.
Gay, Rupert M. Div.
Gruendler Crusher & Pulv. Co.
Pennsylvania Crusher Co.
Raymond Pulv. Division
F. L. Smidth & Co.
Traylor Engineering & Mfg. Co.
Universal Crusher Co.
Universal Road Machinery Co.
Williams Patent Crusher & Pulv. Co.

Pumps (Diaphragm)
Chain Belt Co.
Jaeger Machine Co.

Pumps (Dredge)
Bucyrus-Erie Co.
Hetherington & Berner, Inc.

Pumps (Dry Pulverized Material)
Fuller Company
Smidth, F. L., & Co.

Pumps (Slurry)
Smidth, F. L., & Co.
Wilfley, A. R., & Sons, Inc.

Pumps Valves (Slurry)
Fuller Co.
Wilfley, A. R., & Son, Inc.

Pumps (Vacuum)
Fuller Company
Smidth, F. L., & Co.

Pump Valves (Dry Pulverized Material)
Fuller Co.

Pumps (Water)
Chain Belt Co.
Jaeger Machine Co.

Rails
Bethlehem Steel Co.

Recuperators
Traylor Engineering & Mfg. Co.

Refractories
Smidth, F. L., & Co.

Rewashers (Screw)
Eagle Iron Wks.
Link-Belt Co.
Smith Engineering Works

Roofing
Bethlehem Steel Co.
Gilmore Wire Rope Div.
Jones & Laughlin Steel Corp.
Ryerson, Jos. T., & Son, Inc.
Texas Co.

Sand Drags
Eagle Iron Wks.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Smith Engr. Wks.

Sand and Gravel Plants
Austin-Western Road Machy. Co.
Bacon, Earle C., Co.
Diamond Iron Wks., Inc.
Eagle Iron Works
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
Pioneer Engineering Wks. Inc.
Robins Conveying Belt Co.
Traylor Engineering & Mfg. Co.

Sand Lime Brick Machinery
Diamond Iron Wks., Inc.

Sand Separators
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Smith Engineering Wks.
Simplicity Engr. Co.

Sand Settling Tanks
Eagle Iron Wks.
Hendrick Mfg. Co.
Link-Belt Co.
Nordberg Mfg. Co.
Pioneer Engineering Wks., Inc.
Smith Engr. Wks.

Scales (Conveyor)
Chain Belt Co.
Merrick Scale Manufacturing Co.

Scales (Hopper)
Blaw-Knox Co.
Merrick Scale Manufacturing Co.

Scrapers (Power Drag)
American Hoist & Derrick Co.
Austin-Western Road Machy. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Diamond Iron Wks., Inc.
Harnischfeger Corp.
Hayward Company
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Sauerman Bros., Inc.

Scrapers (Wagon)
Bucyrus-Erie Co.

Screen Cloth & Plates (Perforated)
Bacon, Earle C., Inc.
Brooks Equipt. & Mfg. Co.
Chicago Perforating Co.
Cross Engineering Co.
Gruendler Crusher & Pulv. Co.
Harrington & King Perf. Co.
Hendrick Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Sons, Inc.
Standard Stamping & Perforating Co.
Traylor Engineering & Mfg. Co.
Tyler, W. S., Co.
Universal Crusher Co.
Wickwire-Spencer Steel Co.

Screen Parts
Bacon, Earle C., Co.
Diamond Iron Wks., Inc.
Gruendler Crusher & Pulv. Co.
Hendrick Mfg. Co.
Pioneer Engineering Wks., Inc.
Screen Equipment Co.
Traylor Engineering & Mfg. Co.
Wickwire-Spencer Steel Co.

Screens
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
Diamond Iron Wks., Inc.
Eagle Iron Wks.
Gruendler Crusher & Pulv. Co.
Hendrick Mfg. Co.
Link-Belt Co.
Ludlow-Saylor Wire Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Rogers Iron Works Co.
Roebling's Sons Co.
Smith Engineering Wks.
Simplicity Engr. Co.
Traylor Engineering & Mfg. Co.
Tyler, W. S., & Co.
Williams Patent Crusher & Pulv. Co.

Screens (Grizzly)
Austin-Western Road Machy. Co.
Diamond Iron Wks., Inc.
Eagle Iron Works
Gay, Rupert M. Div.
Gruendler Crusher & Pulv. Co.
Hendrick Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Productive Equipment Corp.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.,
Ross Screen & Feeder Co.
Screen Equipment Co.
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.
Universal Road Machinery Co.

Screens (Laboratory)
Gruendler Crusher & Pulv. Co.
Hendrick Mfg. Co.

Keep your conveyor belts going with

FLEXCO

HD BELT FASTENERS

• **FLEXCO H D RIP PLATES** are used in repairing rips and patching conveyor belts. The wide space between outer bolts gives the fastener a long grip on the edges of the rip, while the center bolt prevents the fasteners from bulging.

• **FLEXCO H D BELT FASTENERS** make a strong, tight butt joint with long life. Recessed plates embed in belt, compress belt ends and prevent ply separation. Five sizes in steel and alloys.

• Avoid shutdowns and lengthen the life of your conveyor belts and bucket elevator belts by using Flexco HD belt fasteners and rip plates. Thousands of companies have stepped up the performance of conveyor lines and cut costs by using Flexco methods.

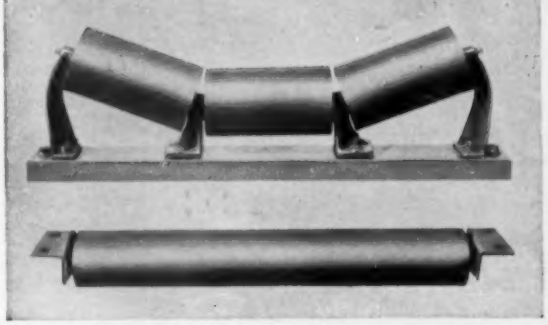
Folder WRP shows exactly how to make tight butt joints in conveyor belts with Flexco HD Belt Fasteners. Also illustrates step by step the latest practice in repairing rips and putting in patches.

FLEXIBLE STEEL LACING COMPANY
4684 Lexington St., Chicago

Write for your copy

FLEXCO HD BELT FASTENERS
Sold by supply houses everywhere

CONVEYOR IDLERS



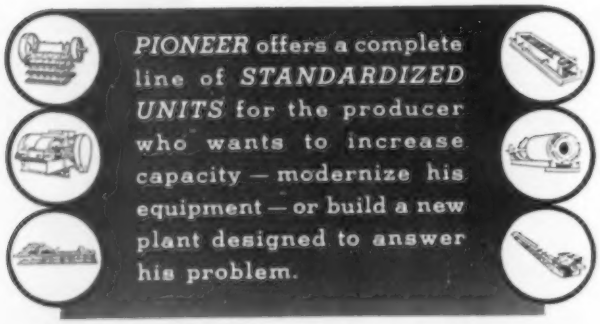
That are easy on Belts

The function of the Idler is to properly support the belt and permit it to move with the least possible friction. Robins Idlers do just that. Robins Idler Pulleys are equipped with roller or ball bearings and have the patented "One-Shot" lubricating system. Complete greasing can be done from either side of conveyor without reaching under or over the belt. Bearing adjustment is automatic. Robins Idlers are easy on belts.

ROBINS CONVEYING BELT COMPANY
15 Park Row, New York, N. Y.
Offices in principal cities

ROBINS

SEND FOR LITERATURE



PIONEER offers a complete line of *STANDARDIZED UNITS* for the producer who wants to increase capacity — modernize his equipment — or build a new plant designed to answer his problem.

PIONEER

PIONEER ENGINEERING WORKS · MINNEAPOLIS, MINN.

COLMONOY No. 6

The Corrosion and Abrasion Resistant Hardfacing Material

Colmonoy No. 6 is the solution to problems of combined corrosion and abrasion, or where freedom from galling is essential. This material when applied by the oxy-acetylene method gives an overlay which is free from porosity and has excellent resistance to corrosion and abrasion. Write today for catalog No. 70.

WALL COLMONOY Corp.
1059 W. GRAND BLVD., DETROIT, MICH.

PERFORATED METAL
SAND AND GRAVEL SCREENS

Manufactured exactly to your specifications
Any size or style screen, in thickness of steel wanted with any size perforation desired.
We can promptly duplicate your present screens at lowest prices.

CHICAGO PERFORATING CO.
2437 West 24th Place
CHICAGO, ILLINOIS
Canal 1459

McLANAHAN EQUIPMENT
for ROCK—
SAND—GRAVEL

Single and double roll and jaw crushers, hammer mills, super dry pans, steel log washers and scrubbers, sand drags, revolving and vibrating screens, elevators, conveyors, dryers, jigs, hoists. Complete portable, semi-portable and stationary crushing, screening and washing plants for different capacities of any materials.

McLanahan & Stone Corporation
Established 1835
Hollidaysburg, Pennsylvania

Classified Directory (Cont.)

Link-Belt Co.
Roebling's, John A., Sons Co.,
Smidth, F. L., & Co.
Tyler, W. S., Co.
Wickwire-Spencer Steel Co.
Williams Patent Crusher & Pulv. Co.

Screens (Revolving)
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Brooks Equipt. & Mfg. Co.
Chain Belt Co.
Diamond Iron Wks., Inc.
Eagle Iron Wks.
Gay, Rupert M. Div.
Gruendler Crusher & Pulv Co.
Hendrick Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.,
Smith Engr. Wks.
Standard Stamping & Perforating Co.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Crusher Co.
Universal Road Machinery Co.

Screens (Rotary)
Link-Belt Co.
Smith Engineering Wks.

Screens, Scalping
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Screen Equipment Co.
Smith Engineering Works
Williams Patent Crusher & Pulv. Co.

Screens (Trommel)
Link-Belt Co.
Traylor Engr. & Mfg. Co.

Screens (Vibrating)
Austin-Western Road Machy. Co.
Bacon, Earle C., Co.
Brooks Equipt. & Mfg. Co.
Chain Belt Co.
Diamond Iron Wks., Inc.
Eagle Iron Works
Gruendler Crusher & Pulv Co.
Hendrick Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co
Pioneer Engineering Wks. Inc.
Robins Conveying Belt Co
Roebling's, John S., Sons Co
Rogers Iron Works Co.
Screen Equipment Co.
Smith Engineering Works
W. S. Tyler Co.
Universal Vib. Screen Co.
Simplicity Engr. Co.
Universal Crusher Co.
Wickwire-Spencer Steel Co.
Williams Patent Crusher & Pulv. Co.

Screens (Washing)
Chain Belt Co.
Link-Belt Co.
Screen Equipment Co.

Scrubbers (Washers)
Link-Belt Co.
Rogers Iron Works Co.
Smith Engineering Wks.
Traylor Engineering & Mfg. Co.
Tyler, W. S., & Co.

Seal Rings
Traylor Engineering & Mfg. Co.

Shafting
Bacon, Earle C., Inc.
Chain Belt Co.
Link-Belt Co.

Shale Planers
Eagle Iron Wks.

Sheaves
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Diamond Iron Wks., Inc.
Eagle Iron Works
Gruendler Crusher & Pulv. Co.
Hetherington & Berner, Inc.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Ransome Concrete Machinery Co.
Roebling's, John A., Sons Co.,
Sanford-Day Iron Wks.
Sauerman Bros.

Shovels (Compressed Air)
Nordberg Mfg. Co.

Shovels, Power (Diesel, Diesel-Air, Electric, Gasoline, Gas-Electric, Oil & Steam)
American Hoist & Derrick Co.
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Industrial Brownhoist Corp.
Koehring Co.
Link-Belt Co.

Shovel Repair Parts (Manganese)
Harnischfeger Corp.

Shovels (Tractor)
Austin-Western Road Machy. Co.
Harnischfeger Corp.
Koehring Co.
Link-Belt Co.

Shovels (Underground)
Harnischfeger Corp.
Nordberg Mfg. Co.

Shredders
Williams Patent Crusher & Pulv. Co.

Sieves (Testing)
Hendrick Mfg. Co.
Roebling's, John A., Sons Co.,
Smidth, F. L., & Co.
Tyler, W. S., Co.

Silos
Blaw-Knox Co.
F. L. Smidth & Co.

Silo Stave Machines (Concrete)
Besser Mfg. Co.

Skids
Besser Mfg. Co.

Slakers (Rotary)
Traylor Engineering & Mfg. Co.

Slugs (Grinding)
Smidth, F. L., & Co.

Slurry Mixers
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Slurry Separators
Smidth, F. L. & Co.

Slurry Thickeners
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Smokestacks
Hendrick Mfg. Co.
Traylor Engineering & Mfg. Co.

Speed Reducers
Bacon, Earle C., Co.
Link-Belt Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Spouts
Chain Belt Co.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
Ransome Concrete Machinery Co.
Traylor Engineering & Mfg. Co.

Sprays & Spraying Equipment
Link-Belt Co.

Sprockets
Bacon, Earle C., Co.
Chain Belt Co.
Diamond Iron Wks., Inc.
Link-Belt Co.

Stabilization Equipment
Barber-Greene Co.
Besser Mfg. Co.
Gruendler Crusher & Pulv. Co.
Pioneer Engineering Wks., Inc.

Standpipes
Ross Screen & Feeder Co.

Steel, Abrasion Resisting
Gilmore Wire Rope Div.
Jones & Laughlin Steel Corp.
Joseph T. Ryerson & Son, Inc.

Steel (Electric Furnace)
Timken Roller Bearing Co.

Steel (Special Alloy)
Timken Roller Bearing Co.

Steel (Open Hearth)
Gilmore Wire Rope Div.
Jones & Laughlin Steel Corp.
Timken Roller Bearing Co.

Stokers
Combustion Engineering Corp.
Link-Belt Co.

Classified Directory (Cont.)

Storage Equipment
Barber-Greene Co.
Blaw-Knox Co.
Link-Belt Co.
Robins Conveying Belt Co.
Sauerman Bros., Inc.

Strippers (Concrete)
Anchor Concrete Machy. Co.
Besser Mfg. Co.
Multiplex Concrete Machy. Co.

Stucco Colors
Mepham, Geo. S., Corp.

Switchboards
Allis-Chalmers Mfg. Co.

Tampers (Power & Hand)
Anchor Concrete Machy. Co.
Besser Mfg. Co.
Kent Machine Co.
Multiplex Concrete Machy Co

Tanks
Blaw-Knox Co.
Combustion Engineering Corp.
Eagle Iron Works
Heltzel Steel Form & Iron Co.
Hendrick Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Raymond Pulv. Division
Traylor Engineering & Mfg. Co.

Towers
Blaw-Knox Co.
Eagle Iron Works
Hendrick Mfg. Co.
Jaeger Machine Co.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Sauerman Bros., Inc.

Track & Track Equipment
Besser Mfg. Co.
Nordberg Mfg. Co.

Track Shifters
Nordberg Mfg. Co.

Track Systems (Overhead)
Link-Belt Co.

Tractors
Koehring Co.

Tractors (Electric)
Link-Belt Co.

Trailers (Industrial & Quarry)
Athey Truss Wheel Co.
Austin-Western Road Machy Co.
Koehring Co.
Sanford Day Iron Wks.

Trucks (Agitator)
Blaw-Knox Co.
Chain Belt Co.
Jaeger Machine Co.
Ransome Concrete Machinery Co.
Smidth, F. L., & Co.

Truck Bodies (Dump)
Athey Truss Wheel Co.
Commercial Shearing & Stamping Co.
Hendrick Mfg. Co.

Trucks (Mixers)
Blaw-Knox Co.
Chain Belt Co.
Jaeger Machine Co.
Smidth, F. L., & Co.
Timken Roller Bearing Co.

Tubing (Seamless Steel)
Timken Roller Bearing Co.

Turnbuckles
Macwhyte Co.

Unloaders
Barber-Greene Co.
Bucyrus-Erie Co.
Chain Belt Co.
Diamond Iron Wks., Inc.
Fuller Company
Gay, Rupert M. Div.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Universal Crusher Co.
Universal Road Machinery Co.

Unloaders (Boat)
Chain Belt Co.
Link-Belt Co.

Unloaders (Box Car)
Barber-Greene Co.
Besser Mfg. Co.
Chain Belt Co.
Diamond Iron Wks., Inc.
Fuller Co.
Gay, Rupert M. Div.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
Universal Road Machinery Co.

Unloaders (Pneumatic)
Diamond Iron Wks., Inc.
Fuller Company

Welding Electrodes
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Harnischfeger Corp.

Unloaders (Underground)
Nordberg Mfg. Co.

Ventilating Apparatus
Blaw-Knox Co.

Vibrators (Bin and Concrete Form)
Besser Mfg. Co.
Link-Belt Co.
W. S. Tyler Co.

Vibrating Screens
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Diamond Iron Wks., Inc.
Eagle Iron Wks.
Gruendler Crusher & Pulv Co.
Hendrick Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Screen Equipment Co.
Smith Engineering Wks.
Simplicity Engr. Co.
Tyler, W. S., & Co.
Universal Vibrating Screen Co.
Universal Crusher Co.
Wickwire-Spencer Steel Co.
Williams Patent Crusher & Pulv. Co.

Wagons (Dump)
Athey Truss Wheel Co.
Austin-Western Road Machy Co.
Blaw-Knox Co.
Koehring Co.

Washers (Log)
Chain Belt Co.
Diamond Iron Wks., Inc.
Eagle Iron Works
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Smith Engineering Works
Traylor Engr. & Mfg. Co.

Washers (Sand, Gravel and Stone)
Austin-Western Road Machy Co.
Bacon, Earle C., Co.
Diamond Iron Wks., Inc.
Eagle Iron Works
Gay, Rupert M. Div.
Gruendler Crusher & Pulv Co.
Hendrick Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co
Roebling's, John A., Sons Co.
Smidth, F. L., & Co.
Smith Engineering Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.
Universal Road Machinery Co.
Wickwire-Spencer Steel Co.

Weighing Equipment
Blaw-Knox Co.
Chain Belt Co.
Fuller Company
Heltzel Steel Form & Iron Co.
Jaeger Machine Co.
Merrick Scale Manufacturing Co.
Schaffer Poidometer Co.

Welding & Cutting Equipment
American Steel & Wire Co. (U. S. Steel Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Ransome Concrete Machinery Co.
Harnischfeger Corp.
Roebling's, John A., Sons Co.
Wickwire-Spencer Steel Co.

Welding Electrodes
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)

Welding Rods
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)

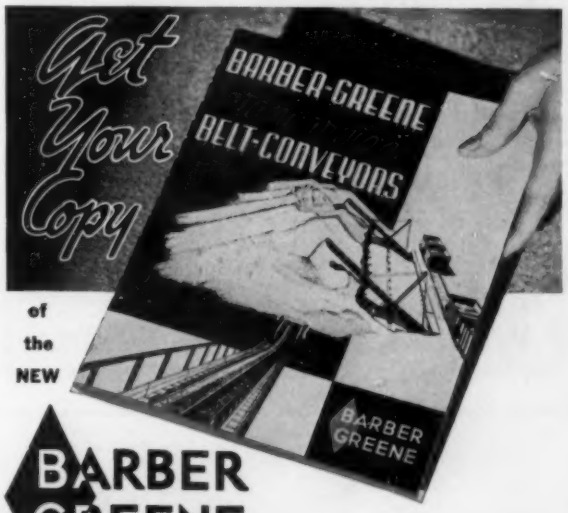
LOW IN OPERATING AND UPKEEP COSTS

MORE PROFIT FOR YOU--

And a new way to overcome competition by enabling you to deliver better mixed, maximum strength, high quality concrete *at the lowest possible cost.*

Write for the facts.

Ransome
CONCRETE MACHINERY CO.
DUNELLEN, NEW JERSEY



BARBER GREENE
BELT CONVEYOR CATALOG AND MANUAL

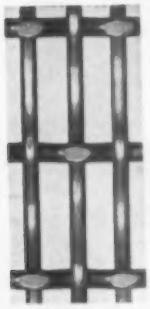
MAIL TODAY— 37-17

Barber-Greene Company, Aurora, Illinois—Gentlemen: Send me without cost or obligation your new 116-page Belt Conveyor Catalog and Manual that not only shows the complete line of B-G *Standardized* Belt Conveyors, but has 20 pages devoted entirely to Engineering Data.

Name.....
Company.....
Address.....
City..... *State*.....

TYLER SCREENS

CIRCLE-THROW MECHANICALLY AND ELECTRICALLY-VIBRATED



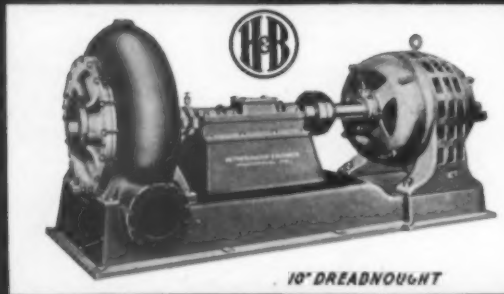
TON-CAP

and Woven Wire Screen
In all Meshes and Metals

Scrubbers and Dryers

THE W. S. TYLER COMPANY
3623 Superior Avenue Cleveland, Ohio

SAND and GRAVEL PUMPS



10" DREADNOUGHT

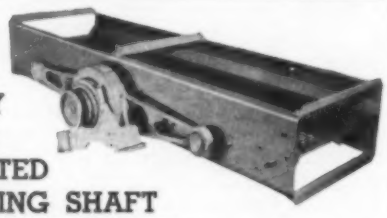
HETHERINGTON & BERNER INC.
741 KENTUCKY AVENUE • • • INDIANAPOLIS, INDIANA

DIAMOND Roller Bearing JAW CRUSHER

Dealers Wanted

Diamond Roller Bearing Crushers have greater capacity, require less power, practically no maintenance, and lubrication cost is negligible.

DIAMOND IRON WORKS INC.
AND THE MAHR MANUFACTURING CO. DIVISION
MINNEAPOLIS, MINNESOTA, U.S.A.



1. COMPLETELY ADJUSTABLE
2. OIL LUBRICATED
3. FULL FLOATING SHAFT
4. STURDY CONSTRUCTION

• Write for "DATA BOOK"

PRODUCTIVE EQUIPMENT CORP.
4600 SOUTH KEDZIE AVENUE CHICAGO U.S.A.

Classified Directory (Cont.)

Gilmore Wire Rope Div.
Jones & Laughlin Steel Corp.
Roebling's, John A., Sons Co.
Ryerson, Jos. T., & Son, Inc

Welding Wire
American Chain & Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Gilmore Wire Rope Div.
Hazard Wire Rope Div.
Jones & Laughlin Steel Corp.
Roebling's, John A., Sons Co.,
Wickwire-Spencer Steel Co.

Wheels (Tracklaying Type)
Athley Truss Wheel Co.

Winches
American Hoist & Derrick Co.
Link-Belt Co.
Robins Conveying Belt Co.

Wire Cloth
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bacon, Earle C., Co.
Cleveland Wire Cloth & Mfg Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Eagle Iron Works
Leschen, A., & Sons Rope Co.
Link-Belt Co.
Ludlow-Saylor Wire Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.,
Screen Equipment Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.
Wickwire-Spencer Steel Co.

Wire (Copper, Iron & Steel)
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Roebling's, John A., Sons Co.,
Wickwire-Spencer Steel Co.

Wire (Electric)
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Roebling's, John A., Sons Co.,
Wickwire-Spencer Steel Co.

Wire Rope
American Cable Co., Inc.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bethlehem Steel Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Gilmore Wire Rope Div.
Hazard Wire Rope Div.
Jones & Laughlin Steel Corp.
A. Leschen & Sons Rope Co.
Macwhyte Co.
Roebling's, John A., Sons Co.,
Wickwire-Spencer Steel Co.

Wire Rope Clips
American Cable Co.
American Hoist & Derrick Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bethlehem Steel Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Gilmore Wire Rope Div.
Hazard Wire Rope Div.
Jones & Laughlin Steel Corp.
Leschen, A., & Sons Rope Co.
Macwhyte Co.
Roebling's, John A., Sons Co.,
Wickwire-Spencer Steel Co.

Wire Rope Coatings
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Co. Subsi.)

Wire Rope Fittings
American Cable Co.
American Hoist & Derrick Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bethlehem Steel Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Gilmore Wire Rope Div.
Hazard Wire Rope Co.
Jones & Laughlin Steel Corp.
Leschen, A., & Sons Rope Co.
Macwhyte Co.
Roebling's, John A., Sons Co.,
Wickwire-Spencer Steel Co.

Wire Rope Hooks
American Cable Co.
American Hoist & Derrick Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Hazard Wire Rope Div.
Leschen, A., & Sons Rope Co.
Macwhyte Co.
Wickwire-Spencer Steel Co.

Wire Rope Lubricants
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Macwhyte Co.
Roebling's, John A., Sons Co.,
Texas Co.

Wire Rope Slings
American Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bethlehem Steel Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Gilmore Wire Rope Div.
Hazard Wire Rope Div.
Jones & Laughlin Steel Corp.
Leschen, A., & Sons Rope Co.
Macwhyte Co.
Roebling's, John A., Sons Co.,
Wickwire-Spencer Steel Co.

Wire Rope Sockets
American Cable Co.
American Hoist & Derrick Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Columbia Steel Co. (U. S Steel Corp. Subsi.)
Hazard Wire Rope Co.
Leschen, A., & Sons Rope Co.
Macwhyte Co.
Roebling's, John A., Sons Co.
Wickwire-Spencer Steel Co.

Wire Rope Thimbles
Macwhyte Co.

DEMPSTER DUMPSTER

2 cu. yd. drop-bottom detachable buckets for any 1½ ton truck. All the load carried on the chassis.

DEMPSTER BROS., INC.
KNOXVILLE, TENN.
WASHINGTON • BOSTON • NASHVILLE • CHICAGO • NEW YORK

CROSS PERFORATED PLATE

FOR VIBRATING, ROTARY AND SHAKING SCREENS

Exact opening for best sizing. Finest, accurate workmanship. Tough, long wearing steel. Prompt, dependable service. Corrugated and heat treated when required. Made in all standard sizes of Round, Square, Hexcreen and Slot Holes. Write for details.

CROSS ENGINEERING CO.
CARBONDALE, PA.
Sales Representatives in Principal Cities

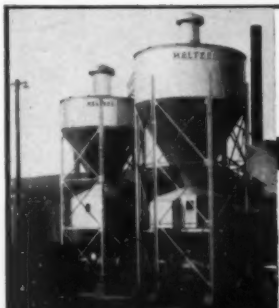
"PENNSYLVANIA" REVERSIBLE HAMMERMILL

A Revolutionary Development because:—

Major Reduction by smashing impact,—
Daily reversal automatically turns and resharpens Hammers and Cage Bars,—
Increased capacity and fineness,—
Lower Power demand per ton,—
Upkeep cost sharply cut,—
Twenty (20) sizes specialized for the varied needs of the Rock Products Industries.

PUT YOUR REDUCTION PROBLEMS UP TO US

PENNSYLVANIA CRUSHER COMPANY
Liberty Trust Bldg., PHILADELPHIA, PA.



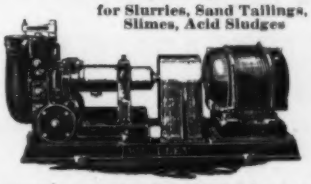
Heltzel
BUILDS IT BETTER

HELTZEL Bulk Cement storage and batching equipment—cost of cement from car to bin as low as 9/10 of a cent per barrel. Bulletin T-28.

HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO, U.S.A.

WILFLEY
centrifugal SAND PUMPS

for Slurries, Sand Tailings, Slimes, Acid Sludges



Save Pumping Costs

Continuous operation without attention for long periods. Stuffing box, stuffing, gland water ALL eliminated. Close clearances maintained by easy slippage seal adjustment. Heavy pumping parts of material best suited for YOUR particular problem. Complete engineering service. Prompt shipment of parts. The most efficient and economical pump you can buy. *Write for Complete Catalog*

A. R. WILFLEY & SONS, Inc., Denver, Colo., U. S. A.
NEW YORK OFFICE: 1775 BROADWAY

HAYWARD BUCKETS

USE RIGHT BUCKET FOR THE JOB

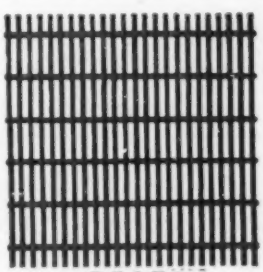
Hayward makes all four—clam shell, drag-line, electric motor, orange peel. A Hayward recommendation is unprejudiced.

THE HAYWARD COMPANY
202-204 Fulton Street
New York, N. Y.

Stripping Costs High?

Check up on S-D Automatic Bottom Dumping Trailers. The trailer that gives you continuous operation . . . discharging and closing on the run, with no auxiliary powered mechanisms. Built for heavy service and easy, fast manipulation. Here's the trailer for stripping hauling and dumping costs to rock bottom. Let an S-D engineer tell you why.

SANFORD-DAY IRON WORKS, 703 DALE AVENUE, Knoxville, Tenn.



Rolled Slot

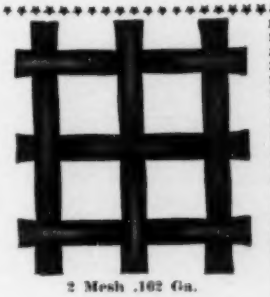
ALLOY No. 2

STAR PERFORMERS

CLEVELAND SCREENS are star performers—returning larger capacities, increased profits and more accurate separations at lower cost. Cleveland Screens save money with the initial investment because, if they are made of the longer-wearing, wear-resisting ALLOY NO. 2—Cleveland Screens stay on the job long after ordinary screens would have been replaced.

★ ★

THE CLEVELAND WIRE CLOTH & MFG. CO.
3574 E. 78TH STREET . . . . . CLEVELAND, OHIO



2 Mesh .162 Ga.

MORE PROFITS FOR YOU

Classified Advertisements

CLASSIFIED RATES

POSITIONS WANTED — POSITIONS VACANT Set in six-point type. Minimum $1.00 each insertion, payable in advance.

INFORMATION—Box numbers in care of our office. An advertising inch is measured vertically in one column. Three columns, 30 inches to the page.

CLASSIFIED—Displayed or undisplayed. Rate per column inch, $5.00. Unless on contract basis, advertisements must be paid for in advance of insertion.

IMMEDIATE LIQUIDATION

of former

CHENANGO-UNADILLA GRAVEL CO.

SO. EDMESTON, N. Y.

Plant Operated Only Four Months. All Equipment in Enclosed Steel Buildings. Installed 1931.

CRUSHERS:
1—36"x18" No. 12B Farrel-Bacon Jaw Crusher, V-belt drive and 100 H.P. Westinghouse 690 RPM. Motor.
2—3' Symons Cone Crushers, each with 50 H.P. direct connected motor; one coarse and one fine bowl.
1—No. 37 Kennedy Gearless Reduction Gyratory Crusher with 50 H.P. synchronous motor in the pulley.

BELT CONVEYORS:
6—Robins Belt Conveyors, trough type, with roller bearing idlers, Model W Goodyear belt, each conveyor equipped with Falk gear reducer, roller chain drive and motor. Each mounted on 5" steel channels:

1—30" wide—212' c/c	1—20" wide—252' c/c
1—24" wide—237' c/c	1—20" wide—288' c/c
1—20" wide—212' c/c	1—20" wide—302' c/c

VIBRATING SCREENS:
7—Traylor Vibrating Screens, made by Traylor Vibrator Co., Denver, Colo. (Now made by Jeffrey Mfg. Co., Columbus, Ohio.) Two FB-2—41" wide by 72"; Five FB-4—48" wide by 84".
3—Motor Generator Sets, 15 volts, for operating these screens.

CENTRIFUGAL PUMP:
1—6" Rumsey Pump, Fig. 1160, with direct connected 100 H.P. Westinghouse motor.

GRAVEL WASHERS:
3—Rotary Scrubbers or Washers: 1—4'x6', 2—4'x8', each with roller chain drive and 20 H.P. motor. Stationary drums with revolving agitators.

SAND DRAGS OR DEWATERERS:
4—Sand Drags, 2—18' c/c with 4' wide blades; 2—24' c/c with 3' wide blades. Each is equipped with Falk gear reducer and 7½ H.P. motor.

ELECTRIC MOTORS:
All 3 ph. 60 cy. 220/440 volts, Westinghouse.
4—7½ H.P., Type CS, 1160 RPM.
4—15 H.P., Type CS, 1160 RPM.
2—25 H.P., Type CS, 1160 RPM.
3—20 H.P., Type CS, 1160 RPM.
1—100 H.P., Type CW, 690 RPM. Slip Ring.
1—100 H.P., Type CS, 1750 RPM.
All of the above motors have serial numbers over 8,100,000.
2—3 ton Model K Cyclone Chain Hoists.
1—20 ton Fairbanks Truck Scale, 9'x20' platform.

SO. EDMESTON IS LOCATED 35 MILES SOUTH OF UTICA ON ROUTE 8. PLANT ON HIGHWAY ROUTE 8.
REPRESENTATIVE ON PREMISES FOR INSPECTION.
ADDRESS INQUIRIES TO NEW YORK OFFICE.
15 PARK ROW, NEW YORK, N. Y.
ASK FOR ILLUSTRATED CIRCULAR.

EQUIPMENT REMAINING AT

MARIANNA LIME PRODUCTS CO. PLANT,

WHITE CLIFFS, ARK.

1—1 yd. BUCYRUS-ERIE DIESEL COMBINATION SHOVEL and DRAGLINE, Type D-2.
3—4 roll RAYMOND HIGH SIDE PULVERIZERS.
1—5'x30' RUGGLES-COLES CLASS A-8 DIRECT HEAT ROTARY DRYER.
1—30"x54" OCALA SINGLE ROLL CRUSHER.
1—No. 4 WILLIAMS JUMBO HAMMER MILL.
13—18" BELT CONVEYORS, various lengths from 15' c/c to 140' c/c.
5—40' c/c BUCKET ELEVATORS, 9x18 buckets.
1—No. 30 CATERPILLAR TRACTOR.
1—60 H.P. FAIRBANKS-MORSE DIESEL ENGINE.
1—10x8" INGERSOLL RAND ER-1 AIR COMPRESSOR.
1—No. 1½ GT LOOMIS CLIPPER WELL DRILL.
80,000 sq. ft. GALVANIZED STEEL CORRUGATED SHEETS.

Send for Illustrated Circular

Kindly Address Inquiries for These Items to

CONSOLIDATED PRODUCTS CO., INC.

P. O. BOX 548, TEXARKANA, ARK.

New 2000 watt Gas Light Plant 25-110V DC.
Kennedy Nos. 19 & 37 and No. 10 McCully Fine Reduction Gyratory Crushers.
2—24x36" Farrell, 30x42" Buchanan type C, 24x72" Traylor Jaw Crushers.
40x15" and 54x24" Anaconda Crushing Rolls.
16, 18 & 19 ton 36" ga. Saddle Tank Locomotives.
75B Lorain Comb. Shovel Crane—Excellent.
200 HP Fulton Diesel Generator Sets 2300-220V.
2T and 3W Monighan Walker Draglines, elec. or diesel.
Vibrating Screens, all makes and sizes.
Anything and everything for quarry operation.
Let us have your inquiries and ask for Bulletin No. 45.

MID-CONTINENT EQUIPMENT CO.
710 EASTGATE PA. 2290 ST. LOUIS, MO.

RAILS—1 Ton or 1000

NEW RAILS—5000 tons—All Sections—All Sizes.
RELAYING RAILS—25,000 tons—All Sections—All Sizes, practically as good as New.
ACCESSORIES—New—Every Track Accessory carried in stock—Angle and Splice Bars, Bolts, Nuts, Frogs, Switches, Tie Plates.
Buy from One Source—Save Time and Money.
'Phone, Write or Wire

L. B. FOSTER COMPANY, Inc.
PITTSBURGH NEW YORK CHICAGO

Completely Rebuilt Chicago Compressor

2-stage type OCB, belt drive, size 22 and 13x16 displacement 1573-CFM @ 100-lb. idler, unloader, lubricator, spare bearings and miscellaneous parts and belt. An exceptionl bargain ($1950.00) f.o.b. cars Phila. Can furnish suitable motor of any current.

T. B. MacCABE CO.
Room 902 Beury Bldg. Phila., Pa.

REBUILT CONSTRUCTION EQUIPMENT

Air Compressors	Material Elevator Platforms
Belt Conveyors	Gasoline Engines
Concrete Vibrators	Pneumatic Tools
Derricks	Concrete Mixers
Elec. Motors & Controls	Plaster Mixers
Saw Tables	Mortar Mixers
Elec. Welders	Centrifugal Pumps
Gasoline & Elec. Hoists	Pressure Pumps
Concrete Buckets	Storage Bins

UNITED HOISTING CO., INC.
Serving Construction Industry for 46 years.
Locust Ave. & E. 135th Street, New York, N. Y.

SEND US YOUR INQUIRIES

20 ton Whitcomb std. gauge Gasoline Locomotive.
No. 3 Northwest ¾ yd. Shovel & Dragline. Rebuilt.
2—Buda 100/150 HP 6 cyl. Gasoline-Oil Engines.
140 HP Fairbks. Morse "32" Diesel with clutch.
150 HP Casey Hedges Marine Portable Boiler.
6" McCully Fine Reduction Crusher & A.C. Motor.
50-B Bucyrus 2 yd. Steam Shovel, new 1929.
Diesel Engines—All Makes—25 to 1150 HP.

MISSISSIPPI VALLEY EQUIPMENT CO.
515 LOCUST ST. ST. LOUIS, MO.

DRAGLINES—Marion 38-A, B-E 46-B & 50-B, L-B K-55.
P&H ½ yd. shovel & crane. Speeder ½ yd. Diesel. ¾ Yd. Buckeye Crane-Dragline. Full revolving. A-1.
Locomotive Cranes—Gas & Steam; 7½ to 40 tons cap.
Barber-Greene Loaders, models 21 to 82. Also Haiss.
2—Portable Crushing & Screening Plants, complete.
CRUSHERS—Jaw, 24x36-18x24-13x36-10x36-8x24-11x20 etc.
Reduction—Newhouse 10" & 7", Kennedy Nos. 19-25-37.
Hammermills—No. 1 Wms. Mammoth 48x48 to Stover 7x13.
JAMES WOOD, 53 W. Jackson Blvd., Chicago, Ill.

"E. C. A. Rebuilt" Quarry and Gravel Plant Equipment

AIR COMPRESSORS
Portable and stationary, belt with elec. or gas power, sizes from 21 cu. ft. to 1,000 cu. ft.

BINS
1—3-compartment, 150 ton Blaw Knox with 10,000 lb. cap. weigh batcher.
7—2-compartment: 1—118 ton Blaw Knox; 1—117 ton Blaw Knox; 1—69 ton Johnson; 1—60 ton Butler; 2—35 ton Blaw Knox; 1—26 ton Heltzel. With or without weigh batchers.
1—1,200 bbl. Blaw Knox round bulk cement bin with 2,000 lb. weigh batcher.
1—275 bbl. Johnson port. bulk cement plant with 1,000 lb. weigh batcher, bucket, elevator and car unloader.

BUCKETS
1—4 yd. class G Hayward clamshell.
35—Williams, Blaw Knox & Owen clamshell, all sizes and types.
6—Dragline: 1—1¾ yd. Northwest; 1—1½ yd. Omaha; 2—1¼ yd. Page class C; 1—1 yd. class M; 1—¾ yd. class C.
3—Dragscraper: 1—1 yd. Sauerman Le Clair; 1—1 yd. Green; 1—½ yd. Green.

CABLEWAYS
1—15-ton Lidgerwood traveling elec. cableway.
1—5-ton Lidgerwood steam cableway.

CARS
30—6 yd. Koppel std. ga. 2-way dump.
44—5 yd. Koppel, Western, Continental, 36" ga. dump.
6—1½ yd. Western 24" ga. wood body dump.
30—5-ton Lakewood, Atlas & Koppel 24" ga. flat cars.

CRANES, DRAGLINES and SHOVELS
1—Link Belt K-55 ser. No. 1698, 70' boom, 2 yd. bucket; also have 2 yd. shovel attachment.
1—Lorain 77-D ser. No. 5682 (new 1938) powered by Caterpillar mod. 13,000 Diesel engine, 60' boom, 1¼ yd. Kiesler clamshell bucket.
1—P & H mod. 650 ser. No. 4188, 65' box type boom, 1¼ yd. bucket.
2—Northwest mod. 104, ser. Nos. 2079 & 1597, 45' boom, 1¼ yd. bucket; one with 1 yd. shovel attachment.
1—Link Belt K-42 ser. No. 1265, 45' boom, 1¼ yd. bucket; also have 1 yd. trench hoe attachment or 1¼ yd. shovel front.
2—Northwest mod. 105, ser. Nos. 2053 & 1532, 40' boom, 1 yd. bucket.
1—Link Belt K-1 ser. No. 1024, 50' boom, 1 yd. bucket.
1—Moore Speed Crane ser. No. 179, 60' boom, ¾ yd. bucket.
2—Osgood Heavy Duty, ser. Nos. 2069 & 2087, 40' boom, 1 yd. bucket & one with 1 yd. shovel attachment.
1—Bucyrus Erie Model 1030, ser No. 10512, comb. crane with 48' boom & ¾ yd. shovel front.
1—Universal mod. 35, ser. No. 1200, 56' boom, ⅝ yd. bucket.
1—Byers Bearcat mod. 37, ser. No. 3299, 30' boom, ½ yd. bucket.
1—Erie type B-2, ser. No. 4122, 1 yd. comb. steam shovel & crane, 40' boom.

CRANES (Gasoline Locomotive)
1—12 ton Brownhoist gas crane No. 2, ser. No. 8881, 8 wheel, 40' boom.

CRUSHERS
5—Gyratory: 1—No. 20 Kennedy; 1—Weston 36-B fine reduction type with 50 HP motor, cap. 90 TPH of 1" mat.; 1—Allis Chalmers Gates No. 5, ser. No. 5331; 1—McCully No. 3; 1—McCully No. 6.
3—Jaw: 1—14" x 36" Cedar Rapids; 1—10" x 20" Climax No. 2¼; 1—9" x 16" Telsmith No. 9-A.
1—Set of Allis Chalmers smooth type crushing rolls 42" x 16".

DERRICKS
4—Steel stiff leg: 1—15 ton Clyde, 50' boom; 1—15 ton Clyde "A" frame barge derrick, 50' boom; 1—10 ton Insley, 80' boom; 1—5 ton Insley, 80' boom.
6—Steel guy derricks: 1—15 ton Terry, 115' mast, 100' boom; 1—10 ton American, 115' mast, 100' boom; 3—6 ton Bedford, 90' mast, 80' boom; 1—5 ton Dobbie, 70' mast, 58' boom.

ELEVATORS
3—Chain Belt vert. enclosed elevators 30', 37', 42'. Cap. 50 TPH.
4—Weller inclined 50' elevators, 75 YPH.

HOISTS
55—Electric, ranging from 20 HP to 125 HP, consisting of triple, double and single drum with A.C. or D.C. mtrs.; some with attached swingers.
38—Gas hoists, ranging from 8 to 120 HP, single, double and triple drums; all standard makes.

LOADER
1—Barber Greene mod. 42-A, ser. No. 23431. Cap. 1¾ YPM.

LOCOMOTIVES
10—Std. ga. gas.; 7—8-ton Vulcan; 3—2-ton Brookville.
7—36" ga. gas.; 2—16-ton Vulcan; 1—14-ton Plymouth; 1—8-ton Whitcomb; 1—7-ton Whitcomb; 1—7-ton Vulcan; 1—6-ton Brookville.
8—24" ga.: 7—Plymouth & Whitcomb, 7-ton; 1—Plymouth 4-ton.

PNEUMATIC TOOLS
6—Wagon drills, Ing. Rand & Gardner Denver with IRX-71 and Gardner Denver 17 & 21 drills.
67—Jackhammer drills, I.R. DCR-23 & S-49 and Gardner Denver mod. 37 & 11-D.
21—Column & tripod drills: I.R. mod. X71 & JC-11; G.D. mod. 17.

PUMPS
135—Centrifugal pumps ranging from 1½" to 3" suction. Cap. 6,000 GPM to 300 GPM; belt driven or with elec, or gas power.

SCREENS
1—4' x 5' Tyler Hummer with gen. set.
1—36" x 12' Good Roads revolving screen.

TRACTORS
3—Allis Chalmers mod. L, gas tractors, ser. Nos. 942, 682 & 637, with Baker bulldozers.
3—Caterpillar tractors, models 65, 60 & 30.

WHIRLEY
1—Wiley Whirley, Mod. 75, No. 2973, 20 ton cap., 75' boom, 3-drum Clyde 80 HP elec. hoist & 30 HP elec. swinger, all complete. Perfect condition.

SEND FOR COMPLETE NEW STOCK LIST.

EQUIPMENT CORPORATION OF AMERICA

PHILADELPHIA — P. O. Box 5471, Kingessing Sta. — Phone Granite 7680
CHICAGO — 1119 S. Washtenaw Ave. — Phone Nevada 2400
PITTSBURGH — P. O. Box 933 — Phone Federal 2000

CRUSHERS

GYRATORY: 42" McCully with 80% brand new parts. 12-N Allis-C. 36" Superior McCully like new. 20" Superior McCully reduced to 16". Telsmith Nos. 4, 5, 6 & 9. Gates Nos. 10, 9, 8, 7½, 6, 5 4 & 3. Also Austins, Kennedys and Traylors.
JAW TYPE: Traylor 84x66, 60x48, 30x60 & 24x72. Buchanan 52x72 & 30x42. Farrel 24x36 & 30x36. P&M 24x36. Good Roads 1030 & 1040. Bakstad 3-jaw 8x20. Misc. 9x16, 8x36, 15x36, Etc.
REDUC. TYPE: 6, 10 & 18" Super. McCulley. 2', 3' & 4' Symons Cone. 7" & 10" Newhouse, Etc.
ROLLS: Allis-C. 36x16, 40x15 & 54x24. Jeff. 30x30.
HAMMERMILLS: Williams Nos. 3, 4, 5 & 9. Others.
MILLS: Kennedy Ball 4x6, 5x6 & 5x8. Kent 34x7". 48" Fuller-Lehigh. 5'x22' Bonnot and others.

MISCELLANEOUS ITEMS
Barges, Bins, Buckets, Boilers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryers, Derricks, Draglines, Dredges, Drills, Engines, Excavators, Elevators, Generators, Hoists, Kilns, Loaders, Locomotives, Motors, Pipe, Pumps, Rail, Screens, Slacklines, Shovels, Tanks, Trucks, Tractors, and many other items located throughout the United States at Bargain Prices.

ALEXANDER T. McLEOD
7229 ROGERS AVENUE — CHICAGO

ATTRACTIVE OFFERINGS

1—Kennedy No. 37 **Fine Reduction Crusher** with 50 H.P. motor—new condition.
1—American Process 5'6" x 40' direct heat **Rotary Dryer.**
1—24 x 36" **Jaw Crusher** manganese fitted.
1—Austin No. 3 **Gyratory** manganese fitted.
2—Allis Chalmers 42 x 16" Type B **Crushing Rolls.**
1—Vulcan 9' x 160' Rotary **Kiln.**
1—Ingersoll-Rand 1257 CFM 2 stage **Air Compressor** with 200 H.P. Westinghouse A.C. motor.
Tyler Hummer 2 & 3 deck **Vibrating Screens.**
Sturtevant No. 1 **Ring Roll,** No. 0 **Rotary Fine Crusher.**
Hardinge 8 x 22" Conical **Ball Mill.**

We have what you need. Favor us with your inquiries.

We are interested in your Surplus Equipment.

BRILL EQUIPMENT CORPORATION
183 Varick St.
NEW YORK CITY

RUBBER BELTING

Transmission ▾ Conveyor ▾ Elevator

"V" BELTS
for
Pumps ▾ Crushers ▾ Pulverizers, etc.

RUBBER HOSE
for
AIR ▾ WATER ▾ STEAM, ETC.

LOW PRICES

CARLYLE RUBBER CO., Inc.
64 Park Place — New York, N. Y.

REBUILT EQUIPMENT

Air Compressors, Air Drills, Hoists, Ice Machine, 16-ton. $200. Clamshell Bucket ¾ yard, $25. Crushers, Conveyors, Concrete Mixer, Pumps, Pressure Tanks, Switches, Gears, Speed Reducers, Platform Scales. Wheel Press 200-ton. Lathes, Shapers, Milling Machine. Radial Drill, Universal Grinder. Motors up to 150 H.P. Transformers, Rotary Converters, M-G Sets, Starters, Switchboards, Circuit Breakers. Electric Locomotives, Derrick, 37-H.P., electric with swinger. Ask for Stock List.

Guyan Machinery Co. Logan, West Virginia

2—Link-Belt dewatering elevators, 36' centers, complete with all steel supporting structure and drive machinery.
2—Strut bar, revolving, scalping screens, 48" diameter, 12' long, with drive machinery.
1—Sauerman, 2 cu. yd. capacity, slackline, electric hoist with 150 H.P. motor and starting equipment.

TERRE HAUTE GRAVEL COMPANY
TERRE HAUTE, INDIANA

BAY CITY ELECTRIC SHOVEL

Full crawler, ¾ yard, ¾ circle, 12' boom, 8'3" dipper sticks, Westinghouse 440 or 220 volt electric motor. Splendid machine for operation in limited quarters. Weight 18,000 Lbs. Write, wire or phone for complete specifications.

E. F. MARSH COMPANY — 4030 Chouteau Avenue
ST. LOUIS, MISSOURI — Phone: Jefferson 6155

Air Compressors { 1000' Ing. Rand. / 1080' Sullivan Angle.
Motors { 400 H.P., 450 R.P.M.—A.C. / 300 H.P., 300 R.P.M.—A.C. / 150 H.P., 720 R.P.M.—A.C.

RENT OR SELL. — QUICK ACTION.

Independent Electric Machy. Co.
300 SO. W. BLVD. — KANSAS CITY, MO.

One Telsmith Revolving Screen 4 ft. by 12 ft., very good condition.
One Apron Feeder.
One Slide Type Feeder.

THE NEWARK SAND & GRAVEL CO.
Newark, Ohio

FOR SALE
USED TRUCK MIXERS
WITH OR WITHOUT TRUCKS

Matt Doetsch Machinery Co.
BOND BLDG., WASHINGTON, D. C.

STANHOPE OFFERS

AIR COMPRESSORS
BELTED: 255, 528, 676, 1000, 1200 & 1570 Ft.
ELECTRIC: 476, 676, 807, 1202, 1722 & 2200 Ft.
DIESEL: 603, 807 & 1000 Ft.
PORTABLE GAS: 110, 160, 220, 310, 540 & 1300 Ft.
STEAM: 49, 310, 525, 1300 & 2200 Ft.

CLAMSHELL BUCKETS, SKIPS AND GRAPPLES
Owen R & & H Stone Grapples.
2 Yd. OWEN Type S Material Handling.
1⅛ Yd., 1 Yd. & ¾ Yd. HAYWARD Class E.
48 Steel Skips 6½ x 6 x 2½.

CRANES AND DRAGLINES
¾ Yd. 5 Ton Brownhoist 30 Ft. Boom.
13 Ton NORTHWEST 50 Ft. Boom Gas.
25 Ton BROWNING & 20 Ton AMERICAN Loco.
25 Ton LINK BELT K-48 Electric, 70 Ft. Boom.

CATERPILLAR SHOVELS
¾ Yd. BYERS Electric.
¾ Yd. KOEHRING Gasoline.
¾ Yd., 1⅛ Yd., 2 Yd. & 4 Yd. MARION Electrics.
1 Yd. NORTHWEST Gas.
1½ Yd. BUCYRUS 41B Steamer.
4 Yd. Bucyrus 120 Electric.

DUMP CARS
46—KOPPEL 1½ Yd. 24 & 30 In. Ga., V Shaped.
15—2 Yd., 3 Yd., 4 Yd. 36 In. Ga.
20—Std. Ga. 12 Yd., 16 Yd., 20 Yd. & 30 Yd. Cap.
15—Std. Ga. 50 Ton Battleship Gondolas.

FLAT CARS
30—5 ton capacity 36" Ga. Flat Cars.
9—50 ton std. ga. heavy duty flat cars.

BALL, ROD AND TUBE MILLS
6 x 8 Pebble Mill & 5 x 5 Batch Mill.
3' x 8" & 5' x 22" HARDINGE CON. Dry Ball Mill.
3' x 26" HARDINGE CONICAL Wet Ball Mill.
6' x 22" HARDINGE CONICAL Pebble Mill.
8' x 22" HARDINGE CONICAL Ball or Pebble Mill.
4x8, 3x6 & 10x9 Straight Ball Mills.
4x16, 5x18 & 5x22 Tube Mills.
3½x8 & 5x7 Air Swept Tube Mills.
2x4½, 3x10 & 5x12 ROD MILLS.

PULVERIZERS
JEFFERY 24 x 20 & 1½ Sturtevant B.R.
RAYMOND Auto. Pulverizer No. 0000, 0 & 2.
RAYMOND Imp Mills No. 4, 32 & 55.
GRUENDLER XXB Mill & Jay Bee No. 3 & 4.
RAYMOND 4 & 5 ROLL MILLS & 5 ft. Chaser M.

STEEL STORAGE TANKS
10,000 Gal., 15,000 Gal. & 20,000 Gal. Cap.

400 BARREL CEMENT BIN
400 Barrel Butler Portable Steel Cement Bin with Fuller automatic batcher, push button control.

SEPARATORS AND COLLECTORS
Gayco 5 ft., 12 ft. and 14 ft. Separators
Type 360 Sly 8x24, 8x52 and 16x42 Dust Collectors.

ROLL CRUSHERS
36x60 Fairmount & 36x16 Allis Chalmers.

JAW CRUSHERS
10x8, 13x7½, 14x7, 15x8, 15x10, 16x9, 16x13, 16x10, 18x11, 20x8, 20x6, 20x10, 20x12, 26x12, 30x15, 30x13, 36x15, 36x30, 36x18, 36x14, 36x9, 36x6, 36x10, 36x24, 42x9, 48x42, 48x36, 60x42, 84x66, 36x16, 9x36, 12x26
Champion, Screen & Elevator.

CONE & GYRATORY CRUSHERS
5 No. 19, 25, 27 & 49 Kennedy.
18 in., 24 in., 30 in., 36 in. and 48 in. Symons Disc.
4—10 TS Traylor 6 ft. Gyratory.
4—Nos. 5 3 & 6 Austin Gyratory.
2—Traylor T-12 Bulldog Gyratory.
8 in. Traylor T. Gyratory.
17 Gates K—Nos. 3, 4, 5, 6, 7½, 8 & 9½.
10 Inch Austin Model 105.
10 & 13 Inch Superior McCullys.
Kennedy 19, 27, 37 & 49.

BUCKET ELEVATORS
7 Steel Encased Chain & Belt Elevators:
15 In. by 60 Ft., 24 In. by 63 Ft., 18 In. by 48 Ft., 12 In. by 36 Ft.
ELEVATOR BELT: 600 Ft., 30 In.—1326 Ft. 20 In. & 18 In., 328 Ft. 16 In., 260 Ft. 14 In.

CONVEYOR PARTS
BELT: 1000 Ft. 60 In., 700 Ft. 40 In., 600 Ft. 36 In., 800 Ft. 20 In., 1642 Ft. 24 In., 517 Ft. 20 In., 207 Ft. 18 In., 500 Ft. 16 In., 300 Ft. 14 In.
IDLERS: 54 In., 42 In., 36 In., 30 In., 24 In., 20 In., 18 In., 16 In.
Head & Tail—Pulleys—Takeup for all sizes.
Steel Frames: 2,000 Ft. 24 In., 30 In. & 36 In. Sections.

ROTARY DRYERS AND KILNS
36 In. x 20 Ft., 3 Ft. x 30 Ft., 4 Ft. x 30 Ft., 54 In. x 30 Ft., 42 In. x 24 Ft., 5 Ft. x 30 Ft., 5 Ft. x 16 Ft., 5 Ft. x 60 Ft., 6 Ft. x 60 Ft., 6 Ft. x 20 Ft., 6 Ft. x 70 Ft., 70 In. x 40 Ft.

STEEL DERRICKS
GUY: 8 Ton 85 Ft. Boom, 15 Ton 100 Ft. Boom, 20 Ton 115 Ft. Boom, 50 Ton 100 Ft. Boom.
STIFF LEG: 5 Ton 70 Ft. Boom, 15 Ton 100 Ft. Boom, 25 Ton 100 Ft. Boom, 75 Ton 135 Ft. Boom.

LOCOMOTIVES
GASOLINE: 2 Ton, 5 Ton, 8 Ton, 12, 14, and 30 Ton.
STEAM: 9 Ton, 20 Ton, 40 Ton, 60 Ton & 80 Ton.
ELECTRIC: 2 Ton, 5 Ton, 8 Ton, 40 Ton.

SCREENS
VIBRATING: 2x4, 3x6, 12x8, 3x8, 3x5, 4x5, 4x8, 4x10, 48x72 & 4x12, 1, 2 & 3 Deck.
HUMMER, ROTEX, NIAGARA & ROBINS.
REVOLVING: 3x12, 3x16, 3½x18, 3x24, 4x16, 4x20, 4x22, 4x24, 5x20, 5x26, 6x26.

COMPLETE PLANTS SOUGHT AND SOLD

R. C. STANHOPE, INC.

(Cable Address: "STANEQUIP" New York)
875 Sixth Avenue, New York, N. Y.
Telephone Pennsylvania 6-3565

Take advantage of the Opportunity offered in the Used Equipment Department to dispose of the equipment that you no longer need.

CONCRETE-CEMENT PLANTS
Johnson concrete plant, 100 yds. complete with bulk cement bin, conveyor, weigh batchers. New 1937.
250 bbls. Blaw Knox cement bin, elevator, screw conveyor, weigh batchers, etc., complete plant.
155 bbls. Fuller cement bin, electric weigh batchers.
110 tons Blaw Knox, steel, 2 compts., weight batchers.
300 bbls. Heltzel cement bin, screw conveyor, elevator.
2 Smith 1 yd. concrete mixers, skid mounted, water tank, hopper and tell tale, electric motor driven.
1 Fuller Kinyon Type B portable cement loader.
1 Fuller Kinyon rotary air compressor.

CRUSHERS—JAW—CONE—GYRATORY
Jaw—6x12, 9x16, 10x20, 11x26, 12x20, 18x36, 24x36.
Gyratory—Gates K, Nos. 4, 5, 6, 7½D, Kennedy Van Saun, Nos. 30, 37, 37S, 49, McCully Nos. 5, 6. McCully Superior 8".

CRANES—SHOVELS—DRAGLINES
1 Clyde Whirley, 25 tons cap., 105' boom, oil fired steam.
1 Browning, electric loco. crane, 15 tons, 45' boom.
1 Marion electric shovel-crane, 1¼ yds., caterpiller.
1 Lima, gas, caterpiller, 1¼ yds., crane-dragline.
1 Lorain, gas, caterpiller shovel, 75B—1½ yds.

CLAM SHELL—ORANGE PEEL BUCKETS
2—Williams Favorite ¾ yd. digging clamshell.
1—Williams Hercules 1½ yd. digging clamshell. NEW.
1—Owen ½ yd. clamshell digging bucket, type M.
1—Hayward ¾ yd. orange peel.

CONVEYOR EQUIPMENT
Jeffrey 20" conveyor, 400' centers, steel frame complete. Has 50 hp. motor, roller bearing rollers.
Barber Greene conveyors, 24", steel frames electric drive, 35' to 45' type N.
Belt conveyors, complete, steel frames, belt and motors, 24", lengths, 45' to 200'.
Conveyor belt, 18", 20", 24", 30".
Head & tail pulleys, take-ups, rollers, idlers.

MISCELLANEOUS
5—Mack Model AB dump trucks pneumatic.
Dredge pumps, 6", 8", 10", 12", 16".
Gas locomotives, 2½ to 35 tons.
V type, side dump steel cars, 2 & 3 yds., 26" ga.
2—Sauerman Crescent ¾ yd. dragline buckets.
Sauerman double drum, gas, dragline hoist, 65 h.p.
Steel stone skips, 1½, 2, 4 yds.
Derricks, Clyde steel stiff leg, 80' boom, 10 tons.
Clyde 3 drum & attached swinger, electric hoist, 75 h.p.

RICHARD P. WALSH CO.
30 CHURCH STREET, NEW YORK, N. Y.

New—RAILS—Relaying
ALL SECTIONS
Also contractors' equipment, "V" shaped and Western cars, 24 and 36-in. gauge, portable track, gas locos. frogs and switches. Attractive prices quoted. Wire, write or telephone for quotations.

M. K. FRANK
480 Lexington Ave., New York, N. Y.
25 St. Nicholas Building Pittsburgh, Pennsylvania

FOR SALE
52—8-Yd. Phoenix type quarry cars, 4' 8½" gauge, Std., heavy axles good condition, have been used on tipple dump, ¾" size MCB couplers.
15—8-Yd. Side dump cars, std. gauge, wood bodies, steel under frame.
Box 868, care of Rock Products, 205 W. Wacker Drive, Chicago, Ill.

FOR SALE OR RENT
Diamond portable crushing plant, nearly new, diesel powered, capacity up to 500 tons per day, for sale or will consider renting on tonnage basis.

ANDERSON EQUIPMENT CO.
Penn Ave. at Water St. Pittsburgh, Pa.

FOR SALE
¾-yd. General Combination Crane & Shovel; also following electric motors:
2—75 hp. 3-phase 60 cycle 220-440-volt.
1—150 hp. synchronous motor 220-440 volt.
1—40-hp. 3-phase 60 cycle 220-440 volt.

YOURTEE-ROBERTS SAND CO.
CHESTER, ILL.

FOR SALE
Model 70 Marion steam shovel 2½-yard bucket, workable condition.
Two 27 ton American locomotives, standard gauge.
Can be seen at Osborn, Ohio.

WABASH PORTLAND CEMENT CO.
DETROIT, MICHIGAN

Selected Modern Equipment
18" Robins Belt Conveyors, 290' & 125'.
4—24" Belt Conveyors, 100' & 750'-c.
24" Weller Automatic Belt Tripper, New.
30" L-B Package Conveyor, 32-ft. Frame.
All Sizes Belt, Idlers, Pulleys, Drives.
3x8 Link-Belt 1-deck Vib. Screen, V-drive.
3x6 Leahy 2-deck Vib. Screen, Motor-drive.
3x8 & 4x8 Niagara 2-deck Vib. Screens.
4x8 Huron 3-d. Vib. Screen, 7½-hp. Motor.
Telsmith Rotary Grizzly, Size 30, New.
Kennedy No. 19 Gyratory Crusher.
24x13 & 36x15 Farrel type B Crushers.
Telsmith 6-B Primary Gyratory Crusher.
Pennsylvania Hammermill, 50-hp. Late type.
Jeffrey Swing Hammer Mill, 15" x 8".
Centrifugal Elect. Water Pumps. All sizes.
800-hp. Kelley Feed Water Heating System.
5-ton Overhead Crane, 20-ft. Span.
I-R type ER-1 Air Compressor, 12x10 cyls.
Worthington Duplex Air Compressor, 660'.
2-drum Gasoline Hoists, 20-hp. & 40-hp.
1-drum 60-hp. Minehoist, Variable Speed.
1¼-yd. Marion Electric Shovel, on Cats.
Hayward Orange Peel Bucket, ½-yd. cap.
Sauerman Crescent Dragline Buckets, ½-yd.
700' of 5" & 8" Bucket Elevators, On Belt.
300' of 6" Manganese Pintle Elev. Chain.
16"x50' & 14"x32' Vert. Bucket Elevators.
10"x34' Encased Vertical Bucket Elevator.

UNVERZAGT
15 Park Row, N. Y. C., Barclay 7-6390

RELAYING RAILS
All Sizes — Any Quantity
Write for Quotations

Midwest Steel Corporation
CHARLESTON, W. VA.
Tie Plates — Angle Bars — All Accessories

ELECTRICAL MACHINERY
Motors and Generators. A.C. and D.C., for sale at attractive prices. New and Rebuilt. All fully guaranteed. Write for List and Prices.

V. M. NUSSBAUM & CO.
Fort Wayne, Indiana

DIESEL OIL ENGINES
10 to 1000 HP.
At prices you can afford to pay.
Electric light plants. Compressors. Quarry, Sand and Contractors' Equipment.

J. D. Anderson Machinery Co.
5516 Maple Ave., St. Louis, Mo.

PIPE
Reconditioned pipe, new threads and couplings, all sizes, ¾ in. to 36 in., guaranteed suitable for all practical purposes.

MARINE METAL & SUPPLY CO.
167 South Street, New York City

FOR SALE
100-B Bucyrus Erie Electric Shovel, 2300 volt, Ward Lenard control, new 1927, excellent operating condition, 3 cu. yd. dipper.

Box 869, care of Rock Products, 205 W. Wacker Drive, Chicago, Ill.

DIESEL ENGINES
MOTORS — GENERATORS
AIR COMPRESSORS — PUMPS
IMMEDIATELY AVAILABLE FROM STOCK

A. G. Schoonmaker Corporation
42 Hudson St., Phone Bergen 4-5300, Jersey City, N.J.

Used Equipment for Sale

FOR SALE

40 Ton American 4-wheel saddle tank locomotive, 14x22" cylinders, four duplicates.
40 Ton Vulcan 4-wheel saddle tank locomotive, 14x20" cylinders.
36 Ton Porter 4-wheel saddle tank locomotive, 14x20" cylinders, two duplicates.
25 Ton Porter 4-wheel saddle tank, 36" gauge, 12x16" cylinders.
21 Ton Vulcan 4-wheel saddle tank, 36" gauge, 11x16" cylinders.
5-Yard Western two way side dump cars, steel underframe, heavy duty. 36" Gauge. Fifty cars available.
2-Yard Bucyrus caterpillar steam shovel. Two duplicates.
2¼ Yard Marion diesel caterpillar shovel. Two duplicates.
2½ Yard Link-Belt diesel dragline. Two duplicates.
6-Yard Monighan diesel walking dragline. Two duplicates.

COMPLETE STOCK LIST ON REQUEST

BIRMINGHAM RAIL & LOCOMOTIVE COMPANY
BIRMINGHAM, ALABAMA

PARTIAL LIST

SYNCHRONOUS MOTORS

300 H.P. Westinghouse 600 RPM, 3 ph.
350 H.P. Ridgway High Torque 900 RPM, 3 ph.
175 H.P. G.E. 600 RPM, 3 phase.
150 H.P. G.E., 1200 RPM, 3 phase.
110 HP. G.E., 900 RPM, 3 phase.
75 H.P. G.E., 1200 RPM, 3 phase.
60 H.P. G.E., 1200 RPM, 3 phase.

MOTORS: SLIPRING & SQ. CAGE

250 H.P. Fairbanks Morse slipring 600 RPM, 3 bearing, ball bearing.
220 H.P. Crocker Wheeler squir. cage 720 RPM.
150 H.P. General Electric 600 RPM squir. cage.
150 H.P. Gen. Elec. slipring 720 RPM.
112 H.P. G.E. slipring holst duty 720 RPM.
100 H.P. Allis-Chalmers 1200 RPM squir. cage.
75 H.P. General Electric 1800 RPM squir. cage.

L. J. LAND
147 Grand Street New York, N. Y.
CAnal 6-3923 & 3924 Est. 1910

Complete CRUSHING Plant

consisting of

24x36 Primary Jaw crusher.
3' cone secondary crusher.
50' bucket elevator.
24" and 30" belt conveyor.
Double deck vibrating screen.

Excellent Condition

Write Box 867, Care of ROCK PRODUCTS 205 W. Wacker Drive.

ROCK PRODUCTS

goes where business is good. In times like the present when the construction industry is showing the greatest activity in years you can depend on ROCK PRODUCTS to deliver your sales message to the real buying power among the producers of the raw materials. List your used machinery items here every month and keep in touch with the men who control 92% of the buying.

WRITE Dept. 33 for 1939 net price catalog on new and reconditioned power transmission equipment.

Teuscher Pulley & Belting Co.
St. Louis, Mo. Since 1899

Concrete Products Equipment For Sale

FOR SALE

The Foote "Hammered" Concrete Stripper Block Machine and the Lackey Sewer Catch-Basin and Manhole Block Machines can now be seen in operation at the Blue Island Concrete Block Co's Plant at 2727 Orchard St. (12400 south and B. & O. C. T. R. R.—½ mile west of Western Ave.) Blue Island, Ills. Phone Blue Island 2842.
H. LACKEY, 858 East 39th St., Chicago, Ills. Phone Drexel 1414. E. HANIFY, 2724 Cochran St., Blue Island, Ills. Phone Blue Island 348. C. A. BATT, 159th & Spaulding Ave., Harvey, Ills. District Representatives.

FOR SALE

One (1) Besser Master Tamper with down face block machine; less than two (2) years old. Tamper can be used with any stripper machine. Cheap for quick sale.

COSHOCTON BUILDERS' SUPPLY
230 North Fifth St. Coshocton, Ohio

Used Equipment Wanted

WILL PAY CASH FOR GOOD:
(1) Lime Hydrating Outfit.
Rotary Kilns and Dryers.
Hammermills, Pulverizers and Rolls.
Ball, Rod and Tube Mills.
Air Compressors: Diesel, Btd., Elec. & Steam.
Crushers: Jaw—Gyratory and Cone.
TIDEWATER EQUIPT. & MACHY. CORP.
101 West 31st Street NEW YORK, N. Y.

WANTED

Sand and Gravel Plant
Complete for Bank Deposit
GENERAL MATERIALS CO.
Baden, Penna.

Business Opportunities

WANTED

Capital to Finish crushed stone plant or will Sell outright. Have good deposit and good market. Located near Chicago, Ill. For further details write.

F. W. HERKEL
3621 Kenilworth St. BERWYN, ILL.

SLAG DEPOSIT FOR SALE

Very large deposit of Blast Furnace Slag especially suitable for manufacture of Rock Wool. Tests prove that quality of wool produced is excellent. Property includes right of way connecting main line of large eastern railroad, 46 tenant houses, and unlimited supply of good soft water. Skilled and common labor available. Low freight rates to eastern markets. Excellent local market for crushed slag for road purposes. Wonderful opportunity for immediate profits. **Write for further details. Box 872, Rock Products, 205 Wacker Drive, Chicago, Ill.**

Positions Wanted

SUPERINTENDENT OF PRODUCTION open for position; wide experience in construction operation and maintenance of crushing equipment, and handling labor economically. I have always reduced operating expenses. Experience includes Stone, Slag, Sand and Gravel. Write Box 871 care of Rock Products, 205 W. Wacker Drive, Chicago, Ill.

WANTED POSITION: WITH SAND AND Gravel Company. Twenty years experience as Plant Manager. Resident Manager and Chief Engineer, Bank or River operation. Plant design and Construction. Best Reference. Box 873, care of Rock Products, 205 Wacker Drive, Chicago, Ill.

WANTED POSITION WITH STONE CO. or Lime Plant. 16 years experience in supervision of open face quarries and lime plants, with by-products. Box 874, care of Rock Products, 205 W. Wacker Drive, Chicago, Ill.

SALES POSITION WITH PORTLAND CEment manufacturer. Am. 31. College education. At present employed in the industry with an excellent sales record. Prepared to assume executive responsibilities immediately. Address Box 875, Care of Rock Products, 205 W. Wacker Drive, Chicago, Illinois.

Consulting Engineers

Wire or write us for
DIAMOND CORE DRILLING SERVICE
with thirty-five years' experience. Steam, Gasoline and Electric drills suitable for any job. Satisfactory cores guaranteed. Prices reasonable.
HOFFMAN BROTHERS DRILLING CO.
Drilling Contractors PUNXSUTAWNEY, PA.

WE LOOK INTO THE EARTH

By using Diamond Core Drills. We drill for Limestone, Gypsum, Talc, Fire Clay, Coal and all other minerals.
PENNSYLVANIA DRILLING CO.
Drilling Contractors
Pittsburgh, Pa.

H. D. RUHM
Consulting Engineer
PHOSPHATE LANDS
all grades of rock.
PHOSPHATE FILLER

40 years' experience TENNESSEE PHOSPHATE FIELD. Correspondence solicited.
305 West Seventh St., Columbia, Tennessee

F. M. WELCH ENGINEERING SERVICE
CONSULTING ENGINEERS GREENVILLE, OHIO
Designers of GRAVEL PLANTS for 30 years

SMALL PLANTS to meet local conditions with flexibility, ample crushing, minimum labor, low first cost and maintenance.
LARGE MODERN PLANTS for metropolitan areas. GROUND STORAGE Plants. OLD PLANTS modernized
CONSULTATION REPORTS

H. J. BROWN
CONSULTING ENGINEER
35 Doane Street Boston, Massachusetts
Specializing in Gypsum Plants and in the Mining, Quarrying and Manufacture of Gypsum Products.
Consultation **Design**
Examinations **Construction**
Reports **Supervision**

WHEN in need of advice on difficult problems of our industry, write the advertisers in this department.

What a Difference Our GAYCO Makes

The Cement Industry has found that the GAYCO CENTRIFUGAL AIR SEPARATORS give 25 to 40% increase in capacity with 25 to 30% greater recovery of fines.

They materially increase the capacity of all types of grinding mills by removing the fines as they are made and preventing the cushioning effect of the fine material.

Easily adjusted to deliver products of any desired screen analysis from 60 to 400 mesh, and when once adjusted they are not affected by variations of speed or rate of feed. Always produce the same uniform products at the same setting. Adjustment for any products can be noted and returned to at any time.

One of the exclusive GAYCO features is the new type adjustable centrifugal sizing fan for rejecting coarse particles.

Write for descriptive bulletin.

Universal Road Machinery Co.

RUBERT M. GAY - DIVISION

114 LIBERTY STREET

New York, N. Y., U. S. A.

GAYCO

MAIN OFFICE AND FACTORY KINGSTON, N. Y.

GAYCO CENTRIFUGAL SEPARATORS

GAYCO

Canadian Representative F. H. HOPKINS & CO., Ltd., 340 Canada Cement Bldg., Montreal, Que., Can.

"RELIANCE" CRUSHING, SCREENING AND WASHING EQUIPMENT

INDEX TO ADVERTISERS

American Cable Co., Inc. .....Inside Back Cover
American Hoist and Derrick Co. 23
American Pulverizer Co... 99
American Steel & Wire Co. 12
Anchor Concrete Machinery Co. 78
Athey Truss Wheel Co.... 21

Bacon, Earle C., Inc..... 86
Barber-Greene Co. 103
Besser Mfg. Co..... 66
Bethlehem Steel Co..... 8
Blaw-Knox Co. 99
Brooks Equipment & Mfg. Co. 96
Bucyrus-Erie Co. ....Outside Back Cover
Buell Engineering Co., Inc. 22

Cement Process Corp.....100
Chain Belt Co..... 95
Chicago Perforating Co...102
Classified Advertising.... 106-109
Cleveland Wire Cloth & Mfg. Co. 105
Columbia Steel Co..... 12
Combustion Engineering Co., Inc. 15
Commercial Shearing & Stamping Co. 72
Cross Engineering Co.....105

Dempster Bros., Inc.....104
Dewey and Almy Chemical Co. 10
Diamond Iron Works.....104
Dixie Machinery Mfg. Co. 89

Eagle Iron Works..... 97
Ensign-Bickford Co..... 16

Flexible Steel Lacing Co..101
Fuller Co. 24

Gay, Rubert M., Div.....110
Gilmore Wire Rope Div... 19
Goodyear Tire & Rubber Co., Inc. 11
Gruendler Crusher & Pulv. Co. 88
Gulf Refining Co..... 91

Harnischfeger Corp. 85
Harrington & King Perf. Co. 88
Hayward Co. 105
Hazard Wire Div..... .....Inside Back Cover
Heltzel Steel Form & Iron Co. 105
Hendrick Mfg. Co..... 99
Hetherington & Berner, Inc. 104

Industrial Brownhoist Corp. 93

Jaeger Machine Co.....9, 87
Jones & Laughlin Steel Corp. 19

Kent Machine Co..... 78
Koehring Co. 112

Leschen, A., & Sons Rope Co. 79
Lima Locomotive Works, Inc. (Locomotive Div.). 97
Link-Belt Co. 1
Ludlow-Saylor Wire Co... 96

McLanahan & Stone Corp.102
Macwhyte Co. 5
Mepham, George S., & Co. 78
Merrick Scale Mfg. Co.... 85
Multiplex Concrete Machinery Co. 76

Naylor Pipe Co..... 88
Nordberg Mfg. Co..... 13

Pennsylvania Crusher Co.105
Pioneer Engineering Works, Inc. 102
Portland Cement Association 72
Productive Equipment Corp. 104

Raymond Pulverizer Div.. 15
Ransome Concrete Machinery Co. 103
Ricketsen Mineral Color Works 78
Robins Conveying Belt Co.101
Roebling's, John A., Sons Co. 14
Rogers Iron Works Co....100
Ross Screen & Feeder Co. 89
Ryerson, Jos. T., & Son, Inc. 3

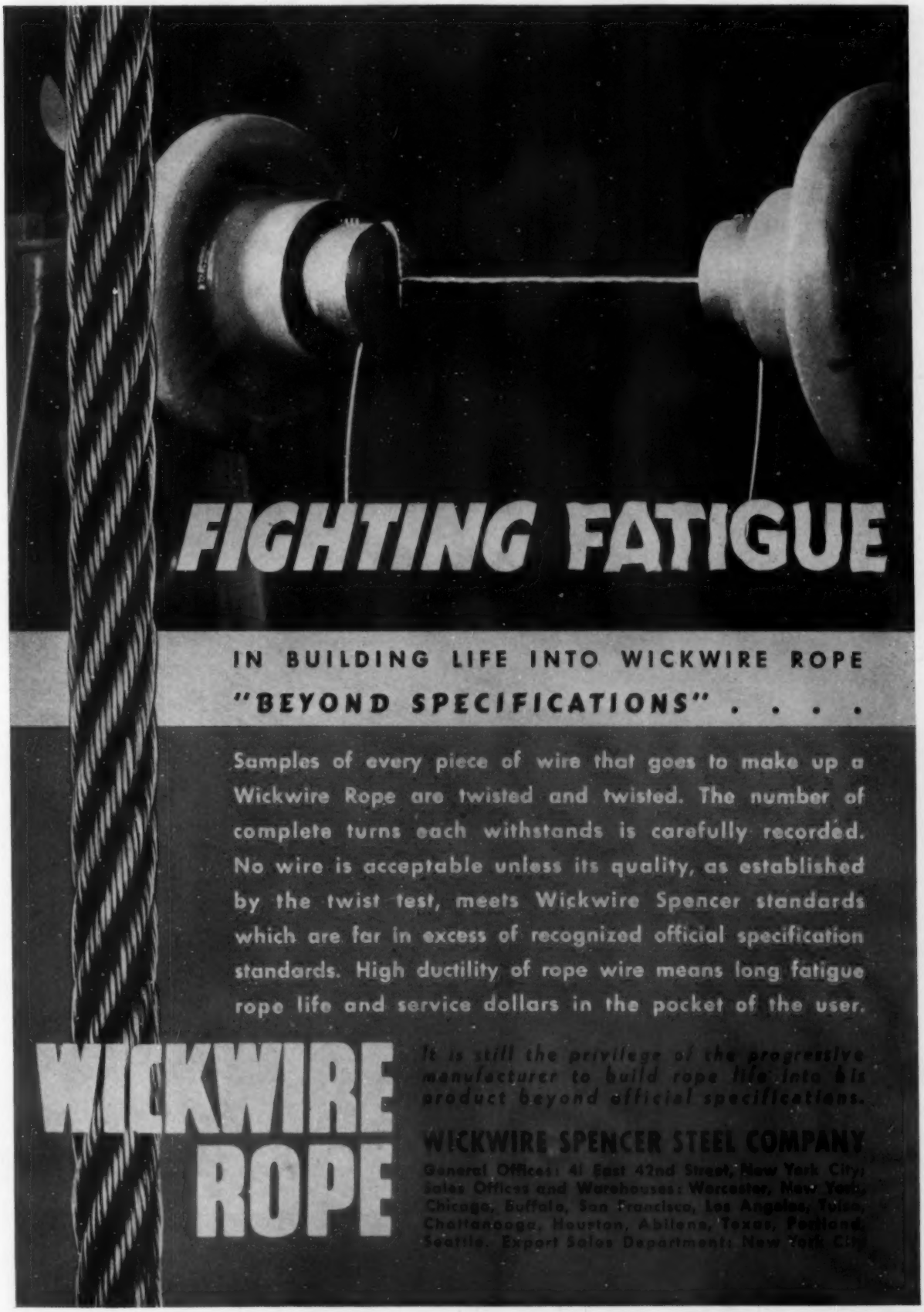
Sanford-Day Iron Works.105
Sauerman Bros. 98
Schaffer Poidometer Co... 89
Screen Equipment Co..... 86
Simplicity Engineering Co. 98
Smidth, F. L., & Co..... .....Front Cover
Smith Engineering Works 17
Standard Stamping & Perforating Co. 87

Texas Co. 4
Timken Roller Bearing Co. 6
Traylor Engineering & Mfg. Co. 7
Tyler, W. S., Co.....101

United States Steel Corp. 12
Universal Concrete Pipe Co., Inc. 78
Universal Crusher Co..... 20
Universal Road Machinery Co. 110
Universal Vibrating Screen Co. 88

Wall Colmonoy Corporation 102
Wickwire-Spencer Steel Co. 111
Wilfley, A. R., & Sons, Inc. 105
Williams Patent Crusher & Pulv. Co..... .....Inside Front Cover

Zagelmeyer Cast Stone Block Machinery Co..... 72


FIGHTING FATIGUE
IN BUILDING LIFE INTO WICKWIRE ROPE
"BEYOND SPECIFICATIONS" . . . .
Samples of every piece of wire that goes to make up a Wickwire Rope are twisted and twisted. The number of complete turns each withstands is carefully recorded. No wire is acceptable unless its quality, as established by the twist test, meets Wickwire Spencer standards which are far in excess of recognized official specification standards. High ductility of rope wire means long fatigue rope life and service dollars in the pocket of the user.
WICKWIRE ROPE
It is still the privilege of the progressive manufacturer to build rope life into his product beyond official specifications.
WICKWIRE SPENCER STEEL COMPANY
General Offices: 41 East 42nd Street, New York City
Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Portland, Seattle. Export Sales Department: New York City

KOEHRING

Ten Trail-Dumps on this Ohio Levee Job.

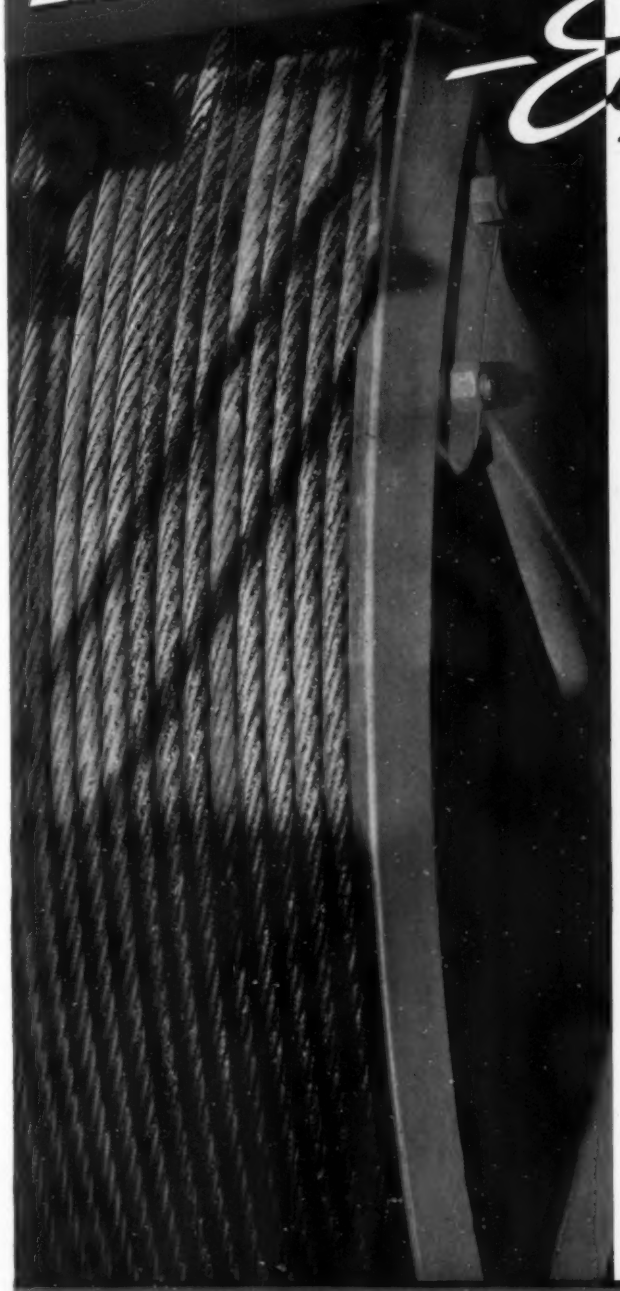
Dig and haul with Koehring—Use Koehring High Speed Excavators with Koehring hauling Equipment. Be sure of profits by using both. Slow excavators absorb your hauling profits and slow hauling equipment cramp the shovel production. Koehring equipment is fast, economical and steady in operation. Many leading contractors are insuring their profits with Koehring equipment.

KOEHRING HEAVY DUTY

KOEHRING COMPANY
CONSTRUCTION EQUIPMENT • MILWAUKEE, WISCONSIN

LAY-SET *Preformed* WIRE ROPE

—*Economizer*



GREEN SIGNIFIES SAFETY

Wherever it is necessary to have economy of operation, increased service from machinery, greater speed of production, or increased safety to workmen—there LAY-SET Preformed Wire Rope is most appreciated.

● Hazard LAY-SET is the all-around economizer because it is most carefully preformed. Before the strands in LAY-SET Wire Rope are finally assembled they are preformed to the exact helical curve they must assume in the finished rope.

● But the preforming process does far more than put all strands in perfect balance. It makes LAY-SET more flexible, limber—easier to handle. It bends around drums and sheaves easily; spools tightly under any load; has remarkable resistance to fatigue. LAY-SET Preformed resists kinking; may be spliced easier and with more certainty. Obviously, LAY-SET Preformed lasts longer—gives greater dollar value.

BUY ACCO QUALITY *whether for Hazard Wire Ropes —American Chains (Weed Tire Chains—Welded or Weldless Chain)—Campbell Abrasive Cutting Machines —Page Chain Link Fence—Page Welding Wire—Reading-Pratt & Cady Valves—Wright Hoists or any other of the 137 ACCO Quality Products.*

HAZARD WIRE ROPE DIVISION

ESTABLISHED 1846

WILKES-BARRE, PENNSYLVANIA

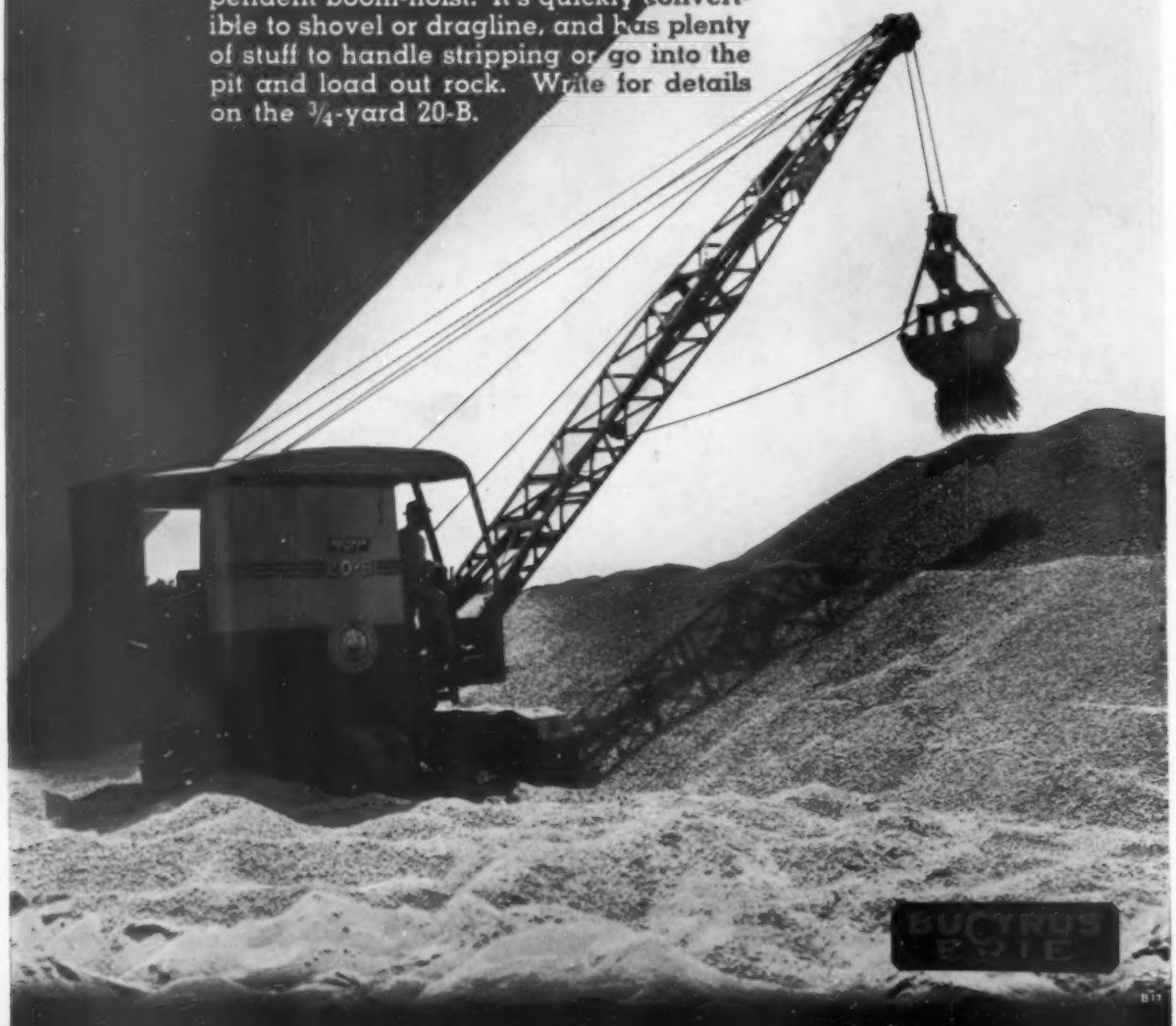
District Offices: New York • Chicago • Philadelphia • Pittsburgh Fort Worth • San Francisco • Denver • Los Angeles • Atlanta • Tacoma

AMERICAN CHAIN & CABLE COMPANY, Inc.

AMERICAN CHAIN DIVISION • AMERICAN CABLE DIVISION • ANDREW C. CAMPBELL DIVISION • FORD CHAIN BLOCK DIVISION • HAZARD WIRE ROPE DIVISION • HIGHLAND IRON AND STEEL DIVISION • MANLEY MANUFACTURING DIVISION • OWEN SILENT SPRING COMPANY, INC. • PAGE STEEL AND WIRE DIVISION • READING-PRATT & CADY DIVISION • READING STEEL CASTING DIVISION • WRIGHT MANUFACTURING DIVISION • IN CANADA: DOMINION CHAIN COMPANY, LTD. • IN ENGLAND: BRITISH WIRE PRODUCTS, LTD. • THE PARSONS CHAIN COMPANY, LTD. • *In Business for Your Safety*

Savings on the Stockpile

It's fast on the swing and the hoist . . . It's not tied down to tracks but can move to any part of your plant in a hurry . . . It's economical to run and will stand up to the toughest work you can give it . . . You can get it with high-speed, independent boom-hoist. It's quickly convertible to shovel or dragline, and has plenty of stuff to handle stripping or go into the pit and load out rock. Write for details on the ¾-yard 20-B.



BUCYRUS-ERIE COMPANY

SOUTH MILWAUKEE, WISCONSIN